Lower Llagas Creek
&
Upper Llagas Creek
Watershed Projects
Work Plan Supplements

ENGINEERING APPENDIX

April 1979

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SECTION I

INTRODUCTION

SUPPLEMENTAL WATERSHED WORK PLAN
LOWER AND UPPER LLAGAS CREEK WATERSHEDS
CALIFORNIA
ENGINEERING APPENDIX

As part of the EIS public involvement process, the sponsors and a Citizens Advisory Committee held a series of meetings to review alternatives to the channel work. The firm of Daniel, Mann, Johnson and Mendenhall (DMJM) was retained to prepare preliminary designs and cost estimates of alternatives for the sponsors and the committee to consider. After the sponsors agreed on the revisions to the plan, DMJM prepared a design summary and cost estimates for the selected plan. The DMJM submittal makes up the bulk of this engineering appendix.

To complete the work plan supplements, it was necessary to break down the DMJM costs still further (e.g., to separate type M, N, and O channel costs; to break landrights costs into land purchase, surveys, fencing, bridges and culverts, and utility modifications; to separate engineering from other installation service). It was also necessary to add some items, such as relocation assistance, and to revise the Chesbro Dam cost estimate. These additional computations are also included herein as marginalia and supplementary computation sheets.

Channel design flows were revised slightly from those in the original plans. See section ~~II~~ V of this appendix.

DMJM was asked to revise gradients and design velocities to reflect more current stability criteria(the original plans assumed sediment-laden flow). The only soils data available for most of the watershed is grain-size distribution and Atterberg limits. At the direction of SCS, DMJM used the clear-water curve of TR-25 Figure 6.1 to establish allowable velocities for non-cohesive soils. A maximum velocity of 6 feet per second was used for cohesive soils. The allowable velocity was checked using the existing soils data given on Table 8A and 8B of the Engineering and Geologic Appendices. (1966) Figure 6-2 of SCS Technical Release 25, October 1977 was used to make the required calculations. PI's and the associated flow depths were taken from the Tables. The 1 percent flood frequency was used with straight alignment. The extreme PI's of 13 and 24 were the basis of the calculations. The resulting velocities for sediment laden flow ranged between 8.1 and 9.6 fps while in sediment free flows.the velocities ranged from 5.0 to 6.7 fps. From these calculations the use of 6.0 fps in the Work Plan Supplement seems appropriate. See sheets 283-290

During final design of Reach #1 of the Lower Llagas Creek, Unconfined Compression Test data was acquired for the reach below station 200+00. This data revealed that the soil strength was high even where the PI's were low. Tractive power force calculations showed that the allowable velocities would be higher than those presented in the Engineering on Geologic Appendices. (See sheets 291 & 292). Even though soils data for the portion of the project under consideration is somewhat limited the PI's correspond to those in the tests below Station 200+00. It is felt that the velocity selected for use in the Work Plan Supplement of 6 fps is within safe bounds. Final design will evaluate stability with additional soil data.

SECTION II

SUPPLEMENT TABLES
for
UPPER LLAGAS CREEK WATERSHED
&
LOWER LLAGAS CREEK WATERSHED

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Lower Llagas Creek Watershed

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TABLE 6 (Revised) - COMPARISON OF BENEFITS AND COSTS

Upper Llagas Creek Watershed, California

(Dollars)

Evaluation Unit	Average Annual Benefits [1/]			Average Annual Cost [3/]	Benefit Cost Ratio
	Damage Reduction [2/]	Employment	Total		
Upper Llagas	1,230,900	127,100	1,358,000	782,000	1.7:1

1/ Price Base: Agriculture at current normalized prices; all others at 1977 prices.

2/ From Table 5.

3/ From Table 4.

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TABLE 5 (Revised) - ESTIMATED AVERAGE ANNUAL DAMAGE REDUCTION BENEFITS

Upper Llagas Creek Watershed, California

(Dollars) [1]

Item	Estimated Average Annual Damage [2]		Damage Reduction Benefits
	Without Project	With Project	
Floodwater			
Agriculture	103,300	0	103,300
Commercial	362,500	0	362,500
Industrial	273,300	0	273,300
Residential	180,300	0	180,300
Subtotal	919,400	0	919,400
Sediment	147,000	0	147,000
Total Direct	1,066,400	0	1,066,400
Indirect	164,500	0	164,500
GRAND TOTAL	1,230,900 [3]	0	1,230,900 [3]

---

[1] Price Base: Agriculture at Current Normalized Prices, all others at 1977 prices.

[2] Damages from floods rarer than the 1 percent event were not evaluated.

[3] Excludes the effects of accelerated land treatment measures, estimated to average $70,300 annually.

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TABLE 4 (Revised) - ANNUAL COST

Upper Llagas Creek Watershed, California

(Dollars) [1]

Item	Amortization of Installation Costs [2]	Operation and Maintenance Cost	Total
All Structural Measures	697,000	85,000	782,000

[1] Price base 1977.

[2] Amortized over 100 years at 3¼ percent.

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TABLE 3B (Revised) - STRUCTURE DATA

CHANNELS
Upper Llagas Creek Watershed, California

Channel Name and Station	Drainage Area sq.mi.	100 yr. Frequency Design Discharge cfs	Channel Gradient ft/ft	Bottom Width ft.	Water Depth ft.	Side Slopes	"n" value Aged	"n" value As Built	Velocities Ft/Sec Aged[1/]	Velocities Ft/Sec As Built[2/]	Excavation Volume cu.yds.	Type of Work[3/]	Existing Channel Type[4/]	Present Flow Condition[5/]
Llagas Creek														
458+00 to 498+15[6/]	58.5	8,900	0.0020	110	9.2	2:1	0.035	0.025	7.5	7.3	170,000	II	N	E
498+15 to 513+00	36.4	5,400	0.0012	90	8.9	2:1	0.035	0.025	5.6	5.5	7/	II	M(1971)	I
513+00 to 522+00	36.4	5,400	0.0018	90	7.9	2:1	0.035	0.025	6.4	6.3	60,000	II	M(1971)	I
522+00 to 582+00	36.4	5,400	Use Levees Along Existing Channel										N	I
582+00 to 625+50	35.7	5,100	Existing Channel Adequate										M(8/)	I
625+50 to 658+50	34.7	5,100	Use Levees Along Existing Channel										M(8/9/)	I
658+50 to 687+00	34.7	5,100	0.0018	90	7.7	2:1	0.035	0.025	6.3	6.2	40,000	II	N	I
687+00 to 714+70	34.3	5,100	Use Levees Along Existing Channel										N	I
714+70 to 743+00	26.9	3,430	Use Levees Along Existing Channel										N	I
West Little Llagas Creek														
11+00 to 46+50	7.2	2,160	0.0010	75	6.12	2:1	0.035	0.025	4.0	3.9	7/	I	O	
46+50 to 75+50	6.2	2,160	0.0020	60	5.7	2:1	0.035	0.025	5.5	5.2	7/	I	O	
75+50 to 86+40	5.1	1,680	0.0020	50	5.4	2:1	0.035	0.025	5.1	5.1	7/	I	O	
86+40 to 96+40	5.1	1,680	0.0020	50	5.4	2:1	0.035	0.025	5.1	5.1	220,000	II	M(8/)	E
96+40 to 130+20	4.8	1,470	0.0020	50	4.93	2:1	0.035	0.025	4.9	4.8	7/	II	M(8/)	E
130+20 to 144+00	4.2	1,300	0.0030	50	4.14	2:1	0.035	0.025	5.4	5.3	70,000	II	M(8/)	E
144+00 to 173+94	3.6	1,300	0.0030	18	5.2	Vert.	0.013	0.013	13.9	13.9	7/	II$_L$	M(8/)	E
173+94 to 195+15	3.6	810	0.0020	16	4.8	Vert.	0.013	0.013	10.6	10.6	7/	II$_L$	M(8/)	E
195+15 to 227+35	3.6	510	0.0045	16	3.9	2:1	0.035	0.025	5.6	5.7	20,000	II	M(8/)	E
East Little Llagas Creek														
0+00 to 6+00	21.0	4,160	0.0018	80	7.3	2:1	0.035	0.025	6.0	5.9	7/	II	M(1971)	E
6+00 to 52+00	18.3	3,630	0.0022	85	6.2	2:1	0.035	0.025	6.1	5.9	7/	II	M(1971)	E
52+00 to 121+50	13.6	2,940	0.0024	70	5.9	2:1	0.035	0.025	6.1	6.0	7/	II	M(1971)	E
121+50 to 180+50	7.9	1,960	0.0026	55	5.2	2:1	0.035	0.025	5.8	5.7	150,000	II	M(1971)	E
180+50 to 183+00	2.7	660	0.0020	30	4.2	2:1	0.035	0.025	4.2	4.2	7/	II	M(1971)	E
183+00 to 220+85	2.7	660	0.0020	30	4.2	2:1	0.035	0.025	4.2	4.2	50,000	II	N	E
Corralitos Creek														
0+00 to 77+50	5.7	1,440	0.0040	55	3.9	2:1	0.035	0.025	6.0	5.8	80,000	II	N	E
Tennant Creek														
77+50 to 126+70	2.6	640	0.0040	25	3.7	2:1	0.035	0.025	5.4	5.4	20,000	II	N	E

[1/] Velocities associated with design discharge

[2/] Velocities associated with 10-year frequency discharge.

[3/] I - Establishement of new channel including necessary stabilization measures.
II - Enlargement or realignment of existing channel.

[4/] N - An unmodified, well-defined natural channel.
M - Manmade ditch or previously modified channel (Approximate date of original construction shown in parentheses.)
O - None or practically no defined channel.

[5/] I - Intermittent - continuous flow through some seasons of the year but little or no flow through other seasons.
E - Ephemeral - flows only during periods of surface runoff, otherwise dry.

[6/] Includes station equation: 483+50 = 487+35

[7/] Included in next entry.

[8/] Date unknown (prior to 1920).

[9/] Natural channel upstream from Sta. 650+00.

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TABLE 3A (Revised) - STRUCTURAL DATA

GRADE STABILIZATION STRUCTURES 1/

Upper Llagas Creek Watershed, California

Station	Design Discharge (cfs)	Drop (feet)	Estimated Concrete Volume (cu.yds.)
Llagas Creek			
498+15	5,400	3.5	488
510+00	5,400	4.0	488
West Llagas Creek			
11+00	2,160	6.0	237
226+00	510	5.0	174
East Little Llagas Creek			
0+00	4,160	7.5	488
32+00	3,630	5.0	270
83+00	2,940	4.5	270
121+00	2,940	3.5	227
Corrallitos Creek			
6+45	1,440	3.0	174

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TABLE 2 (Revised) - ESTIMATED COST DISTRIBUTION

Upper Llagas Creek Watershed, California

(Dollars)[1]

Item	Installation Cost - P.L. 566 Funds					Installation Cost - Other Funds				
	Construction	Installation Services		Relocation Payments	Total P.L. 566	Land Rights	Relocation Payments	Other	Total Other	Total Installation Cost
		Engineering	Other							
Floodwater Retarding Structure										
Raising Chesbro Dam	4,750,000	1,050,000	300,000	28,000	6,128,000	2,415,000	17,000	33,000[2]	2,465,000	8,593,000
Channel Work										
Llagas Creek										
458+00 to 498+15 (N)[3]	767,000	140,000	50,000	--	957,000	332,000	--	--	332,000	1,289,000
498+15 to 522+00 (M)	555,000	100,000	30,000	--	685,000	119,000	--	--	119,000	804,000
658+50 to 687+00 (N)	360,000	60,000	20,000	--	440,000	149,000	--	--	149,000	589,000
West Little Llagas Creek										
11+00 to 86+40 (O)	834,000	160,000	50,000	--	1,044,000	451,000	--	--	451,000	1,495,000
86+00 to 144+00 (M)	195,000	40,000	15,000	9,000	259,000	558,000	6,000	2,000[4]	566,000	825,000
144+00 to 195+15 (M)	905,000	170,000	60,000	4,000	1,139,000	269,000	2,000	2,000[4]	273,000	1,412,000
195+15 to 227+35 (M)	93,000	20,000	10,000	--	123,000	151,000	--	--	151,000	274,000
East Little Llagas Creek										
0+00 to 183+00 (M)	755,000	150,000	50,000	--	955,000	1,084,000	--	--	1,084,000	2,039,000
183+00 to 220+85 (N)	105,000	20,000	5,000	--	130,000	161,000	--	--	161,000	291,000
Corralitos and Tennant Creeks										
0+00 to 45+20 (N)	514,000	100,000	30,000	--	644,000	192,000	--	--	192,000	836,000
45+20 to 126+70 (N)	139+00	30,000	10,000	--	179,000	433,000	--	--	433,000	612,000
Leveed Flood Plain										
Llagas Creek										
522+00 to 582+00 (N)	156,000	30,000	10,000	--	196,000	479,000	--	--	479,000	675,000
582+00 to 658+50 (M)	95,000	20,000	5,000	3,000	123,000	239,000	2,000	2,000[4]	243,000	366,000
687+00 to 714+70 (N)	65,000	20,000	10,000	--	95,000	79,000	--	--	79,000	174,000
714+70 to 743+00 (N)	96,000	20,000	5,000	--	121,000	166,000	--	--	166,000	287,000
TOTAL	10,384,000	2,130,000	660,000	44,000	13,218,000	7,277,000[5]	27,000	39,000	7,343,000	20,561,000

[1] Price Base 1977.

[2] Inclused $4,000 for relocation assistance advisory services and $29,000 for state dam filing fee.

[3] Type of existing channel:
(N) An unmodified well-defined natural channel.
(M) Manmade or previous modified channel.
(O) None or practically no defined channel.

[4] Relocation assistance advisory services.

[5] Includes $510,000 for surveys and legal fees, $1,664,000 for a road relocation at Chesbro Reservoir, [illegible]00 for bridges and culverts, $100,000 f[illegible]ity modifications, and $600,000 for fencing.

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TABLE 1 (Revised) - ESTIMATED PROJECT INSTALLATION COSTS

Upper Llagas Creek Watershed, California

Item	Unit	Number	Estimated Cost (Dollars) [1/]		
			PL-566 Funds	Other Funds	Total
LAND TREATMENT					
Soil Conservation Service					
Cropland	Acres	6,862	--	280,000	280,000
Pasture & Hayland	Acres	1,200	--	22,000	22,000
Rangeland	Acres	3,000	--	18,000	18,000
Miscellaneous	Acres	20	--	60,000	60,000
Technical Assistance			40,000	60,000	100,000
Subtotal - SCS			40,000	440,000	480,000
Forest Service					
Woodland (Fire Control)	Acres	16,000	120,000	120,000	240,000
Land Rights			--	70,000	70,000
Technical Assistance			20,000	20,000	40,000
Subtotal - Forest Service			140,000	210,000	350,000
TOTAL LAND TREATMENT			160,000	650,000	830,000[2/]
STRUCTURAL MEASURES					
Construction					
Floodwater Retarding Structure No. 1			4,750,000	--	4,750,000
Channel Work [3/]					
(N)	Miles	4.3	1,885,000	--	1,885,000
(M)	Miles	6.6	2,503,000	--	2,503,000
(O)	Miles	1.4	834,000	--	834,000
Leveeed Flood Plain	Miles	2.8	412,000	--	412,000
Subtotal - Construction			10,384,000		10,384,000
Installation Services					
Engineering			2,130,000	--	2,130,000
Other			660,000	--	660,000
Subtotal - Installation Services			2,790,000	--	2,790,000
Other Costs					
Land Rights			--	7,277,000	7,277,000
Relocation Payments			44,000	27,000	71,000
Relocation Assistance Advisory Service				10,000	10,000
State Dam Filing Fees				29,000	29,000
Subtotal - Other Costs			44,000	7,343,000	7,387,000
TOTAL STRUCTURAL MEASURES			13,218,000	7,343,00	20,561,000
TOTAL PROJECT			13,398,000	7,993,000	21,391,000

1/ Price Base 1977.

2/ Includes approximately $617,000 in land treatment accomplished prior to this supplement.

3/ Type of existing channel:
(N) An unmodified, well defined natural channel
(M) Manmade ditch or previously modified channel.
(O) None or practically no defined channel.

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TABLE 6 (Revised) - COMPARISON OF BENEFITS AND COSTS

Lower Llagas Creek Watershed, California

(Dollars)

Evaluation Unit	Average Annual Benefits 1/			Average Annual Costs 3/	Benefit Cost Ratio
	Damage Reduction 2/	Employment	Total		
Lower Llagas	$1,558,400	159,300	1,717,700	$837,000	2.0:1

1/ Price Base: Agriculture at current normalized prices. All other at 1977 prices
2/ From Table 5.
3/ From Table 4.

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TABLE 5 (Revised) - ESTIMATED AVERAGE ANNUAL DAMAGE REDUCTION BENEFITS

Lower Llagas Creek, California

(Dollars)[1]

Item	Estimated Average Annual Damages[2] Without Project	With Project	Damage Reduction Benefits
Floodwater			
Agriculture	$ 209,700	0	$ 209,700
Commercial	269,500	0	269,500
Industrial	415,100	0	415,100
Residential	262,700	0	262,700
Subtotal	1,157,000	0	1,157,000
Sediment	204,100	0	204,100
Total Direct	1,361,100	0	1,361,000
Indirect	197,300	0	197,300
GRAND TOTAL	$1,558,400[3]	0	$1,558,400[3]

---

[1] Price Base: Agriculture at current normalized prices; all others at 1977 prices.

[2] Damages from floods rarer than the 1 percent event were not evaluated.

[3] Excludes the effect of accelerated land treatment measures, estimated to average $204,500 annually.

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TABLE 4 (Revied) - ANNUAL COST

Lower Llagas Creek Watershed, California

(Dollars) 1/

Item	Amortization of Installation Cost 2/	Operation and Maintenance Cost	Total
All Structural Measure	$747,000	$90,000	$837,000

1/ Price Base 1977.

2/ Amortized over 100 years at 3¼ percent.

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TABLE 3A (Revised) - STRUCTURE DATA

CHANNELS

Lower Llagas Creek Watershed, California

Channel Name And Station	Reach	Drainage Area 1/ sq.mi.	100 yr. Frequency Design Discharge cfs	Channel Gradient ft/ft	Bottom Width ft.	Water Depth ft.	Side Slopes	"n" Value Aged	"n" Value As Built	Velocities ft/sec Aged 2/	Velocities ft/sec As Built 3/	Excavation Volume cu.yds.	Type of Work 4/	Existing Channel Type 5/	Present Flow Condition 6/
Llagas Creek															
0+00 to 30+00	L-1	103.7	10,000 7/	0.001	140	11 to 11 10/	3:1 & 2:1	0.030	0.024	4.1 to 5.0 10/	6.9 11/	12/	II	Completed	I
30+00 to 47+50	L-1	103.7	14,300 8/	0.001	140	13.9 to 12.9 10/	3:1 & 2:1	0.030	0.024	5.4 to 5.9 10/	6.9 11/	12/	II	Completed	I
47+50 to 64+00	L-1	89.7	13,900 9/	0.001	110 to 121	14.2 to 13.7 10/	2:1	0.030	0.024	7.1 to 6.6 10/	varies	290,000	II	Completed	I
64+00 to 93+40	L-1	89.7	13,900 9/	0.0007	140	14.2	2:1	0.035	0.025	5.8	5.7	12/	II	M(1946)	I
93+40 to 127+40	L-1	89.7	17,100	0.0007	155	15.2	2:1	0.035	0.025	6.1	6.0	12/	II	M(1946)	I
127+40 to 182+00	L-1	85.8	16,300	0.0007	150	15.0	2:1	0.035	0.025	6.0	5.9	1,750,000	II	N	E
182+00 to 190+80	L-1	85.8	16,300	0.0004	190	15.5	2:1	0.035	0.025	4.7	4.6	12/	II	M(1971)	E
190+80 to 294+00	L-2	67.7	10,100	0.0005	180	14.3	2:1	0.035	0.025	4.8	4.8	12/	II	M(1971)	E
294+00 to 379+00	L-3	61.1	9,300	0.0009	180	11.4	2:1	0.035	0.025	5.7	5.6	880,000	II	M(1971)	E
379+00 to 386+00	L-4	61.1	9,300	0.0010	180	11.1	2:1	0.035	0.025	5.9	5.8	12/	II	N	E
386+00 to 420+00	L-4	58.5	8,900	0.0008	180	11.5	2:1	0.035	0.025	5.4	5.3	12/	II	N	E
420+00 to 441+00	L-4	58.5	8,900	0.0003	140	14.0	2:1	0.035	0.025	3.8	3.7	12/	II	N	E
441+00 to 458+00	L-4	58.5	8,900	0.0020	110	9.2	2:1	0.035	0.025	7.5	7.3	520,000	II	N	E
West Branch Llagas Creek															
0+00 to 55+00	W-1	18.3	5,200	0.0009	90	9.5	2:1	0.035	0.025	5.0	5.0	12/	II	M(1971)	E
55+00 to 169+00	W-1	13.3	4,200	0.0013	80	8.5	2:1	0.035	0.025	5.4	5.3	520,000	II	M(1971)	E
169+00 to 182+00	W-1	13.3	4,200	0.0013	80	8.5	2:1	0.035	0.025	5.4	5.3	90,000	I	O	E
182+00 to 220+00	W-2	6.6	2,900	0.0013	70	7.0	2:1	0.035	0.025	5.0	4.9	170,000	II	N	E
220+00 to 226+00	W-2	6.6	2,900	0.0023	60	6.5	2:1	0.035	0.025	6.2	6.1	12/	II	N	E
226+00 to 297+00	W-2	6.1	2,700	0.0023	60	6.2	2:1	0.035	0.025	6.0	6.0	290,000	II	N	E
Lions Creek															
182+00 to 211+00	LN-1	4.3	2,000	0.0012	50	6.9	2:1	0.035	0.025	4.6	4.5	12/	I	O	E
211+00 to 235+00	LN-2	2.2	900	0.0025	20	5.6	2:1	0.035	0.025	5.2	5.4	12/	I	O	I
235+00 to 245+00	LN-2	2.2	900	0.0035	20	5.1	2:1	0.035	0.025	5.9	6.1	12/	I	O	E
245+00 to 281+00	LN-2	2.1	800	0.0025	20	5.2	2:1	0.035	0.025	5.0	5.2	12/	I	O	E
281+00 to 285+00	LN-2	2.1	800	0.0025	20	5.2	2:1	0.035	0.025	5.0	5.2	210,000	II	N	E
Morey Channel															
211+00 to 227+00	M-1	1.2	450	0.0018	20	4.2	2:1	0.035	0.025	3.8	3.9	12/	I	O	E
227+00 to 230+00	M-1	1.2	450	0.0018	20	4.2	2:1	0.035	0.025	3.8	3.9	12/	II	M(13/)	E
230+00 to 245+00	M-1	0.5	200	0.0060	15	2.3	2:1	0.035	0.025	4.8	4.9	40,000	II	M(13/)	E
North Morey Channel															
217+00 to 233+00	NM-1	0.7	280	0.0060	15	2.6	2:1	0.035	0.025	5.2	5.3	20,000	I	O	E

1/ Areas tributary to Llagas Creek include the Upper Llagas Creek Watershed.
2/ Velocities associated with design discharge.
3/ Velocities associated with 10 year frequency discharge.
4/ I - Establishment of new channel including necessary stabilization measures.
 II - Enlargement or realignment of existing channel or stream.
5/ N - An unmodified, well-defined natural channel.
 M - Manmade ditch or previously modified channel (approximate date of original construction shown in parentheses).
 O - None or practically no defined channel.
6/ I - Intermittent - continuous flow through some seasons of the year but little or no flow through other seasons.
 E - Ephemeral - flows only during periods of surface runoff, otherwise dry.
7/ 10 year frequency discharge.
8/ 25 year frequency discharge.
9/ 50 year frequency discharge.
10/ Based on backwater from Pajaro River.
11/ Based on normal depth.
12/ Included in next entry.
13/ Date unknown (prior to 1920).

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TABLE 3 (Revised) - STRUCTURE DATA

GRADE STABILIZATION STRUCTURES 1/

Lower Llagas Creek Watershed, California

Station	Design Discharge (cfs)	Drop (feet)	Estimate Volume of Concrete (cu. yds.)
Llagas Creek			
127+40	16,300	7.0	1,350
150+00	16,300	6.0	1,350
182+00	16,300	4.5	1,350
194+00	10,100	7.0	825
230+00	10,100	6.0	825
260+00	10,100	4.5	825
294+00	9,300	8.0	825
330+00	9,300	3.0	825
386+00	9,300	4.0	825
420+00	8,900	4.0	825
441+00	8,900	5.0	825
West Branch Llagas Creek			
55+00	4,200	4.5	490
111+00	4,200	4.0	490
182+00	2,900	7.5	270
220+00	2,900	3.0	270
250+00	2,700	4.0	270
Lions Creek			
220+00	900	6.0	175
268+00	800	5.0	175

1/ Concrete volumes and cost estimates are based on drop spillway structures. Grouted rock chutes will also be considered at the time of final design.

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TABLE 2 (Revised) - ESTIMATED COST DISTRIBUTION

Lower Llagas Creek Watershed, California
(Dollars) 1/

	Installation Cost - PL-566 Funds					Installation Cost - Other Funds				
	Construction	Installation Services		Relocation Payments	Total PL-566	Land Rights	Relocation Payments	Other Costs	Total Other	Total Installation Cost
		Engineering	Other							
Channel Work										
Llagas Creek										
0+00 to 64+00 (M) 2/	580,000	110,000	35,000	--	725,000	266,000	--	--	266,000	991,000 3/
64+00 to 127+00 (M)	1,238,000	230,000	80,000	--	1,548,000	240,000	--	--	240,000	1,788,000
127+40 to 182+00 (N)	2,203,000	410,000	140,000	--	2,753,000	371,000	--	--	371,000	3,124,000
182+00 to 379+00 (M)	3,705,000	690,000	230,000	3,000	4,628,000	1,258,000	2,000	1,000 4/	1,261,000	5,889,000
379+00 to 458+00 (N)	2,374,000	440,000	150,000	10,000	2,974,000	644,000	5,000	2,000 4/	651,000	3,625,000
West Branch Llagas Creek										
0+00 to 169+00 (M)	930,000	180,000	60,000	--	1,170,000	1,122,000	--	--	1,122,000	2,292,000
169+00 to 182+00 (O)	166,000	30,000	10,000	3,000	209,000	494,000	2,000	1,000 4/	497,000	706,000
182+00 to 220+00 (N)	283,000	50,000	20,000	7,000	360,000	453,000	3,000	1,000 4/	457,000	817,000
220+00 to 297+00 (N)	501,000	100,000	30,000	7,000	638,000	442,000	3,000	1,000 4/	446,000	1,084,000
Lions Creek										
182+00 to 195+00 (O)	126,000	25,000	10,000	--	161,000	154,000	--	--	154,000	315,000
195+00 to 281+00 (O)	430,000	78,000	29,000	--	537,000	445,000	--	--	445,000	982,000
281+00 to 285+00 (N)	10,000	2,000	1,000	--	13,000	13,000	--	--	13,000	26,000
Morey Channel										
211+00 to 227+00 (O)	49,000	10,000	3,000	--	62,000	63,000	--	--	63,000	125,000
227+00 to 245+00 (M)	19,000	5,000	2,000	--	26,000	142,000	--	--	142,000	168,000
North Morey Channel										
217+00 to 233+00 (O)	38,000	8,000	2,000	--	48,000	53,000	--	--	53,000	101,000
TOTAL	12,652,000	2,368,000	802,000	30,000	15,852,000	6,160,000 5/	15,000	12,000	6,181,000	22,033,000

1/ Price base 1977 or actual costs
2/ Type of existing channel:
(N) An unmodified, well-defined natural channel.
(M) Manmade ditch or previously modified channel.
(O) None or practically no defined channel

3/ This work accomplished previous to this supplement.
4/ Relocation assistance advisory services.
5/ Includes $430,000 for surveys and legal fees, $2,480,000 for bridge replacements, $160,000 for utility modifications and $530,000 for fencing.

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TABLE 1 (Revised) - ESTIMATED PROJECT INSTALLATION COST

Lower Llagas Creek Watershed, California

Installation Cost Item	Unit	Number	Estimated Cost (Dollars) 1/		
			PL-566 Funds	Other Funds	Total
LAND TREATMENT					
Soil Conservation Service					
Cropland	Acres	5,370	--	180,000	180,000
Pasture & Hayland	Acres	550	--	25,000	25,000
Rangeland	Acres	1,440	--	15,000	15,000
Miscellaneous			--	5,000	5,000
Technical Assistance			15,000	20,000	35,000
TOTAL LAND TREATMENT			15,000	245,000	260,000 2/
STRUCTURAL MEASURES					
Construction					
Channel Work - (N) 3/	Miles	4.8	5,371,000	--	5,371,000
(M)	Miles	9.7	6,472,000	--	6,472,000
(O)	Miles	2.7	809,000	--	809,000
Subtotal - Construction			12,652,000	--	12,652,000
Installation Services					
Engineering			2,368,000	--	2,368,000
Other			802,000	--	802,000
Subtotal - Installation Services			3,170,000	--	3,170,000
Other Costs					
Land Rights			--	6,160,000	6,160,000
Relocation Payments			30,000	15,000	45,000
Relocation Assistance Advisory Services			--	6,000	6,000
Subtotal - Other Costs			30,000	6,181,000	6,211,000
TOTAL STRUCTURAL MEASURES			15,852,000	6,181,000	22,033,000
TOTAL PROJECT			15,867,000	6,426,000	22,293,000

1/ Price base 1977 or actual cost.

2/ Includes $143,000 worth of land treatment done previous to this supplement.

3/ Type of existing channel:
(N) An unmodified, well-defined natural channel.
(M) Manmade ditch or previously modified channel.
(O) None or practically no defined channel.

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SECTION III

LLAGAS CREEK

ENGINEERING APPENDIX TO WORK PLAN SUPPLEMENT

JANUARY 10, 1977

(FINAL)

ENR CCI = 2494 in January 1977

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LLAGAS CREEK

ENGINEERING APPENDIX TO WORK PLAN SUPPLEMENT

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I INTRODUCTION

This Engineering Appendix has been organized to provide supporting technical information to a Work Plan Supplement which will be prepared to modify the original Watershed Work Plan, dated 1967, for Llagas Creek. More particularly, this Engineering Appendix modifies a previous Engineering Appendix, dated 1966, which accompanied the original Work Plan.

Some completed channel improvements, in accordance with the original Work Plan Concept, have been constructed for a short section of Llagas Creek. In addition, some channels were excavated only as part of a new freeway project. All subsequent construction has been deferred because of environmental regulatory requirements.

Environmental studies were made in 1974 and a Citizens Advisory Committee was formed for the purpose of introducing public participation. The Citizens Committee was presented with several alternate structural solutions. Non-structural solutions were also included for their consideration.

The selected structural plan recommended by the Committee, a modified version of which was adopted by the Sponsors, was essentially a channel alternate similar to the original work plan, but modified as described later in this report. Some non-structural measures were also recommended but are not discussed in this report.

II ORIGINAL DESCRIPTION OF 1967 WATERSHED WORK PLAN

A. General. The 1967 Work Plan included:

1. Raising of the existing Chesboro Reservoir to provide additional flood detention storage.
2. Providing flood protection on the valley floor using an excavated channel solution to increase the capacity of the existing creek bed to accommodate the design flood.
3. Fire protection measures in the upper watershed.
4. A land treatment program.

The plan provided flood protection against a one percent chance flood.

B. Chesbro Reservoir. A description of the raising of Chesbro Reservoir is contained in the 1967 Work Plan and Appendices. Essentially the project consists of raising the dam crest to provide increased flood detention.

C. Channel Improvements and Related Work. In addition to enlarging the existing creek channels and providing erosion protection, the Work Plan included bridge construction and utilities relocation. Some diversion of existing channels was proposed. Excessive meanderings of the existing creek would be corrected by constructing the new channel in a straight alignment.

D. Engineering and Geologic Appendices. Prepared in 1966, the Appendices were intended to supplement the Work Plan and furnish engineering criteria and preliminary design information for the final design of the project.

E. Work Completed in Accordance with the Plan.

1. Reach No. 1. Reach No. 1 begins at the confluence of Llagas Creek and the Pajaro River and extends upstream to a point 1,500 feet above Bloomfield Road. The improvements were constructed in 1973 and include excavation of the creek bed, relocation of the existing levees, installation of inlet structures and placement of riprap. Work on Bloomfield Road bridge was deferred and costs are included in this current engineering appendix to complete the bridge.

2. Channel Improvements Related to Freeway Construction. Reaches 3, 5, 9 and 14 as designated on Plate 1 were excavated by the State Highway Department (CALTRANS). The excavation was performed concurrently with the construction of the freeway (Highway 101 bypass

of Morgan Hill and Gilroy). Excavation is now substantially complete except as required for grade control structures. Bridges and culverts at freeway crossings are complete. Some erosion protection is installed.

III ENGINEERING CONCEPT (Modified Work Plan)

A. General. Engineering Criteria and Preliminary Design will be as shown in the Engineering Appendix to the 1967 Work Plan except as modified or supplemented as discussed below.

B. Peak Flows. Revised design peak flows related to the 1% chance flood are as shown in Table 1 and are as furnished by the Government except as noted on Table 1 for the channel downstream from Station 93+00.

C. Maximum Allowable Velocities. 6.0 f.p.s. for cohesive soils and according to Figure 6.1 (Curve 1) Technical Release No. 25 for non cohesive soils.

D. Channel Alignment. The design center line locations shown on the plan and profile exhibits in the 1966 Work Plan Appendix have been used for all reaches unless otherwise noted.

E. Reach Numbering and Stationing. To assist the Sponsors and the Citizens Committee in their study of various alternates, the project was divided into numbered reaches. The relation between the reach numbering and the Work Plan stationing is shown on the Project Map. (Plate No. 1.)

F. Excavated Channels. The selected project plan proposes the use of excavated channels similar in detail to the 1967 Work Plan. The channels are generally increased in cross sectional area to accommodate the increased design flows at lower maximum velocities. Excavated channels will be constructed in all reaches except in Reach 6B and for a portion of Reach 6A. Part of the channel program includes rectangular concrete channels for Reach 8A and a portion of Reach 8B.

G. Levee Protected Floodway. A portion of Reach 6A and all of Reach 6B will be contained by levees. Levees will be set back from the creek to form an overbank floodway of sufficient width to contain the peak flows. The levees will be suitably modified at each end of the floodway to form a smooth transition between floodway and excavated channel.

H. Natural State. A portion of Reach 6A immediately south of San Martin Avenue is adequate to accommodate the peak design flow and will be left in a natural state except for the amount of levee required for a hydraulic transition from floodway to natural creek. Rights of way will be acquired to provide for maintenance roads.

I. Deletions. Reach 7C, Edmundson Creek, is deleted from the original

Work Plan because a private developer proposes to construct the reach. A low flow diversion in Reach 7A is also deleted.

J. Creek Diversions. The original flow diversions proposed in the 1967 Work Plan are to remain. A low flow diversion structure will be provided in Reach 7A. ← NOW DELETED, AS NOTED 3 LINES ABOVE. Final design should include provision for maintaining nominal low flows in abandoned ox-bow sections resulting from channel straightening.

K. Environmental Mitigations and Landscaping. The original 1967 Work Plan included seeding of the channel. Areas will be seeded as previously proposed. Supplemental work in the modified work plan consists of specific landscaping concepts and additional environmental mitigating measures.

L. Chesbro Reservoir. There are no changes from the original project as described in the 1967 Work Plan and Appendices. Only the cost estimate has been updated.

IV CHANNEL IMPROVEMENTS

A. General. Full details of channel improvements and related work are contained in the Engineering Appendix to the 1967 Work Plan. The following information is intended to modify and supplement the original Engineering Appendix to the Work Plan, prepared in 1966.

B. Layout Plans and Soils Data. Refer to the Plates 19 through 29 in the original Engineering Appendix. Freeway construction shown therein as proposed is now completed. Refer to new Plate 1 (attached) for correlation between reach numbering and work plan stationing.

C. Channel Profiles and Typical Sections. Channel profile design as shown on original Plates 19 through 29 is superseded. Revised channel profiles are shown on new Plates 6 through 16 (attached). Typical sections of a trapezoidal channel are shown on Plate 2. A typical section of concrete lined rectangular channel is shown on Plate 3.

D. Levee Profile and Typical Sections. Plate 1 shows the limits of levee construction on Reaches 6A and 6B. The profile, Plate 11, shows the existing creek bed and the estimated water surface and the design height of the levees. A short transition section is shown at each end of the levee construction. A typical section of levee controlled floodway is shown on Plate 4.

E. Hydraulic Design Summary. Tabulated values for the principal hydraulic units and the dimensional variables related to the typical cross sections are shown on Plates 18 through 20. A value of n = 0.035 (estimated per Engineering Handbook Section 5, Supplement B) was used for all excavated trapezoidal sections. For concrete lined rectangular channels a value of n = 0.013 was used. In addition, the channel design in non-cohesive reaches was tested for a 10 percent flood using a value of n = 0.025. In all cases the velocity did not exceed the allowable maximum. Flow calculations were based on the Manning formula applied in accordance with SCS National Engineering Handbook Section 5. For trapezoidal cross sections, a b/d ratio of 10 was generally used. The freeboard height was computed at about 0.2 times specific energy. A minimum velocity of 2 f.p.s. was maintained to avoid silting and deposition.

Excavated channels were designed in the following manner.

1. The design peak flows were divided by the maximum velocity or assumed maximum velocity to establish a minimum cross sectional area of channel.

2. A trial unit value of "d" was selected which appeared adequate and considered the effect of specific energy change at the junction with the upstream reach.

3. Generally "b" was then made equal to 10d except for small trapezoidal channels and rectangular channels.

4. An optimum slope was selected which was compatible with the natural ground slope. A uniform slope throughout each reach was maintained where feasible.

5. The trial cross section and slope were checked for actual velocity and compared with the maximum permitted velocity.

6. If necessary, a new value of "d" was selected and/or the slope adjusted until a reasonably close hydraulic balance between elements was obtained.

Levee controlled floodways were designed to accommodate the overspill resulting from the difference between the existing creek capacity and the peak design flows. Velocities in the overbank sections were limited to 4 f.p.s. to minimize erosion of the newly constructed levee. An "n" value of 0.050 was used for the overbank portion of the levee cross section. A freeboard height of two feet was provided for all levees.

F. Transitions. Transitions will be computed by the method described in the 1967 Work Plan Appendix.

G. Curves. The alignment of improved channels is the same as the 1967 Plan. All curves having a radius of under 800 feet will be as listed in the 1967 Work Plan Appendix.

H. Channel Linings. Channels in cohesive soils will be unlined except at channel bends, transitions and structures where riprap will be placed. Channels in non cohesive soils will be lined with riprap as shown on Plate 2. Riprap thickness is as shown on the original Work Plan and will extend three feet below channel bottom and one foot above the water surface. Filter material, nine inches thick, will be provided under all riprap. Rectangular channels in Reachs 8A and a portion of 8B, will be lined with concrete as shown on Plate 3. A covered concrete lined section or box culvert will be constructed between Third Street and Fifth Street in Morgan Hill.

I. Grade Stabilization Structures. All structures were assumed to be box inlet drop spillways, similar to the "Folded Crest Drop Spillway" described in the 1966 Work Plan Appendix. This type of structure is more effective in the larger and deeper channels and for cases where the depth of flow is significantly greater than the required drop. In order to estimate approximate quantities, a typical range of structures was sized for varying flows, channel widths and drops. Estimated concrete quantities for each size are shown on Table 5. For cost estimate purposes, the structure closest to the actual design requirements was selected.

The final design of the structure will incorporate a fish ladder. Exact details of the ladder will be developed from further study of the migrating fish types.

Rock chutes will be considered as an alternative to drop structures during the final design stage.

J. Drainage Inlets. The number of drainage inlets as shown on the 1967 Work Plan Appendix was increased arbitrarily in proportion to the increase in design peak flows to make some allowance for additional construction costs. Specific locations were not established. The number of inlets is shown in Appendix B.

K. Bridges and Culverts. Existing bridges which were previously considered adequate to pass the 1967 design flows were assumed to be still adequate unless a significant change of profile grades suggested replacement. The length of proposed bridges equals the channel width at the revised design water surface level where the crossing is made. Tabulation of physical data for each proposed bridge is given in Tables 2A and 2B. For flows less than 2,000 c.f.s., an R.C.B. box culvert was substituted for a bridge. Sizes of proposed culverts were increased to accommodate the revised design flows. Size and location of new R.C.B. culverts are shown on Table 3A.

Reach 14, from Church Avenue to East Middle Avenue, contains four highway crossings recently constructed by the State consisting of multi-cell box culverts. The box culverts were designed to pass the design flows specified in the 1967 Work Plan. Although the design flows are unchanged between Station 0+00 and Station 121+50, the allowable velocity has been reduced from 8 f.p.s. to 6 f.p.s. necessitating a wider channel and reduced depth of flow. From Station 121+50 to Station 180+50 the design flow has also been increased. In order to retain the existing culverts, the bottom of channel profile of the proposed channel improvements will conform to the floor elevations of the existing box culverts. Additional cells will be added to the present structures as noted in Table 3A.

Reach 8A contains a significant amount of proposed box culvert construction. The connecting channel between culverts is a rectangular concrete section. Table 3B shows the equivalent amount of Federal channel corresponding to the box culvert portions.

L. Fords. Two existing fords on Reach 6A and 6B will remain as fords under the selected plan. The banks of the channel or levee will be flattened to a 6 to 1 slope for accessibility. A 12-foot wide concrete roadway will be built across the channel or natural creek bed. The wetted perimeter of the trapezoidal channel will be riprapped for a distance of 50 feet above and below the ford.

M. Maintenance Roadways. Maintenance roadways, 18 feet wide, will be constructed adjacent to all channels. Typical locations are shown on Plates 2 through 5. The roadway will not be paved. The concrete lined channel through Morgan Hill will be provided with a maintenance road along one side of the channel.

N. Rights of Way (Construction). Rights of way for construction will be acquired to include channel and levee construction, maintenance roadways, and drainage ditches. Right of way width for trapezoidal channels is shown on Plate 2, and for rectangular channels, on Plate 3. Right of way width for levee construction is shown on Plate 4. Portions of Reaches 6A and 6B will be left in a natural state. Rights of way will be acquired to include the creek bed and a maintenance road on each side of the existing creek as shown on Plate 5.

A Land Acquisition Summary is shown on Table 4.

In the event that right of way acquisition proves too costly or creates a hardship for the property owner, then consideration should be given to reducing the maintenance road requirements or realigning the maintenance road away from the channel for short distances.

O. Rights of Way (Landscaping). Provision has been made for future landscaping requirements. In the absence of an approved landscaping plan a constant width of 10 feet on each side of the creek has been assumed for estimating land acquisition costs for landscaping. The acquisition cost is in addition to the cost of land acquired for construction purposes.

The amount of additional acreage estimated for landscaping purposes is shown on Appendix E and is itemized as an additional cost in Appendix C.

V ENVIRONMENTAL MITIGATION MEASURES

A. Channel Design and Construction. Long range stream erosion in the channels will be reduced through flatter stream bed slopes, rock lining (riprap) of erodible channel banks, vegetative planting of all channel banks not lined, and the use of permanent drop structures or spillways.

Disturbance of channel bottom percolation zone(s) in Reaches 6A and 6B will be minimized by either leaving the creek in a natural state or using levees for flood protection. The prime groundwater recharge areas will be undisturbed.

During construction, the contractor should be required to operate and maintain all facilities and equipment required to maintain the quality of water flowing through the work site. Spills of petroleum products and/or chemicals should be avoided.

The drop structures or spillways and other features included to mitigate the bank erosion problem (above) will reduce velocity, increase detention time and will mitigate against lower water temperature and improve dissolved oxygen content. Replacement of shading vegetation will restore loss of habitat for shade seeking creek wildlife.

Every effort will be made to preserve the Virgil Moniz house and its grounds in Morgan Hill in Reach 8B. If the house cannot be saved, a detailed architectural and archeological study of the premises should be conducted prior to construction.

Prior to construction, sample excavations should be undertaken at the three possible prehistoric sites in the section of Llagas Creek south of San Martin to Buena Vista Avenue. Based on this determination, salvage excavations will be provided. Archeological salvage will be done in consultation with the National Park Service.

Installation of a "low flow" inner channel will concentrate low flows and provide an adequate depth to allow passage of migrating fish.

Installation of fish ladders at all drop structures in the main channel will permit passage of migrating fish.

Short term decrease in air quality due to construction dust generation and vehicle emissions can be mitigated to a certain extent by limiting the transportation of materials and/or equipment to designated roads or areas. Dust can be minimized by clean up, sprinkling, or other acceptable practices.

B. Channel Landscaping. The natural creek channel has developed over years of interaction between water, soil, plant and weathering process. Generally the creek is uneven and natural, having a variety of tree groves and plant masses. There is an inherent sense of visual continuity to the natural creek.

The proposed creek channelization will create a sudden change to the creek bed, creek edges and surrounding environment. In order to provide environmental mitigation and landscaping measures, general landscape concepts have been developed as shown on Plate 6.

1. Retain as many major trees and plant masses as possible. The large tree groves and plant masses are key elements of both the intimate and distant visual landscape.

2. Plant large clusters of trees at all public road crossings and along the creek where it parallels public roads. The tree and plant masses will screen the newly constructed channels and ultimately create a pleasant, natural and spacial experience in the public areas.

3. Plant tree clusters at random distances along the new channels. The tree groves will visually tie the creek into the surrounding landscape, creating a natural environment.

4. Allow native wildflowers, grasses and shrubs to be re-established along the new channel.

C. Levee Landscaping. A similar concept will be applied to the levee design in Reaches 6A and 6B as shown on Plate 7.

D. Natural Creek. Existing trees are to remain. If removal is necessary for maintenance access, the trees should be replanted. Plant tree clusters and random distances along the natural channel at strategic locations to add interest and continuity to the landscaping concept.

VI ESTIMATED COSTS FOR CHESBRO RESERVOIR

All costs for raising Chesbro reservoir were furnished by the Government. Construction cost estimates are in three parts.

		As Furnished 1973-74	Escalated to 1975
a)	Raising Chesbro Reservoir	\$1,700,000^{73}	\$2,040,000*
b)	Road Relocation	1,261,000^{73}	1,513,000***
c)	Land, Buildings and Relocation Allowances	2,420,000^{74}	2,662,000**
d)	Geologic Investigations	-	60,000
e)	Stability Analysis	-	100,000

The above costs do not include Engineering and Administration costs. Such incidental costs are included in the Cost Summary Table in Part VII of this report.

Cost tabulations are detailed in Appendix A. Items d) and e) have been added to the usual 25 percent engineering and administration allowance.

* Superseded. See section XIII

** " See section XVI

*** Updated. See section XVI

VII ESTIMATED COSTS FOR CHANNEL IMPROVEMENTS

A. Unit Costs. Unit costs for all construction and land purchase items are based on 1975 prices and are shown on Table 6.

B. Channel Costs. Channel costs include all work related to the creek improvements such as channel excavation, channel lining, grade stabilization and control structures, drainage inlets, seeding and landscaping. Channel excavation quantities exclude prior excavation by others. The cost tabulations are detailed in Appendix B.

C. Other Construction Costs. Other construction costs include bridges, culverts and relocation of utilities. Cost tabulations are detailed in Appendix C.

D. Land Costs. Land costs include land acquisition and the cost of buildings when removal is required. Cost tabulations for each reach are detailed in Appendix C.

E. Reach No. 1. The actual cost of construction for work completed is $580,000. Replacement of the bridge at Bloomfield Road was deferred. The estimated replacement cost in 1975 dollars is $213,000. The above costs are included at the foot of Table 8.

VIII COST SUMMARY TABLE

A summary of all estimated costs is detailed on Table 8. Costs are tabulated as follows:

A. Capital Costs. Capital costs comprise:

1. Installation Costs relate directly to actual channel construction and are as detailed in Attachment A. Engineering and Administration charges, computed at 25 percent of construction cost, are shown in the adjacent column.

2. Other Installation Costs cover all other construction items and are as detailed in Attachment B. Engineering and Administration charges, computed at 25 percent of construction cost, are shown in the adjacent column.

3. Land Costs are detailed in Attachment B. Administration charges, computed at 15 percent of construction cost, are shown in the adjacent column.

B. Average Annual Costs.

1. Capital costs are amortized using a factor of 0.03388 based on

a rate of 3-1/4 percent for a 100 year period. The rate of 3-1/4 percent corresponds to the Federal Project Evaluation Rate for 1968.

2. Costs for routine channel maintenance are estimated at $2,000 per mile per year.

3. Costs for Chesbro Dam maintenance were furnished by the South Santa Clara Valley Water Conservation District.

Prob. includes non-project costs

DESIGN PEAK FLOWS FOR ALL CHANNEL REACHES
1% CHANCE FLOOD

NNEL CH	STATION DESIGNATIONS		SOIL TYPE C=COHESIVE N.C.=NON-COHESIVE	Q DESIGN CAPACITY (C.F.S.)
	START	END		
	LOWER LLAGAS CREEK			
*	0+00	30+00	C	10,000
	30+00	47+50	C	14,000
	47+50	64+00	C	13,900
*	64+00	93+00	C	13,900
	93+00	121+00	C	17,100
	121+00	127+40	C	17,100
	127+40	150+00	C	16,300
	150+00	160+00	C	16,300
	160+00	182+00	N.C.	16,300
	182+00	190+80	N.C.	16,300
	190+80	294+00	N.C.	10,100
	294+00	379+00	C	9,300
	379+00	386+00	C	9,300
	386+00	420+00	N.C.	8,900
	420+00	441+00	N.C.	8,900
	441+00	458+00	N.C.	8,900
	UPPER LLAGAS CREEK			
	458+00	498+15	N.C.	8,900
	498+15	513+00	N.C.	5,400
	513+00	522+00	N.C.	5,400
A	522+00	580+00	N.C.	5,400
	580+00	650+00	N.C.	5,100
	650+00	687+00	N.C.	5,100
	687+00	703+00	N.C.	5,100
b	703+70	724+50	N.C.	3,430
	724+50	735+00	N.C.	3,430
	WEST LITTLE LLAGAS CREEK			
A	0+00	11+50	N.C.	2,160.
	11+50	46+50	N.C.	2,160

CHANNEL REACH No.	STATION DESIGNATIONS		SOIL TYPE C=COHESIVE N.C.=NON-COHESIVE	Q DESIGN CAPACITY (C.F.S.)
	START	END		
7A	75+50	96+40	C	1,680
7b	96+40	130+20	C	1,470
	130+20	144+00	C	1,300
	EDMUNDSON CREEK			
7C	0+00	17+00	C	465
	WEST LITTLE LLAGAS CREEK			
8A	144+00	173+94	C	1,300
	173+94	195+15	C	810
8b	195+15	227+35	C	510
	WEST BRANCH LLAGAS CREEK			
9	0+00	55+00	C	5200
	55+00	169+00	C	4,200
10	169+00	182+00	C	4,200
	LIONS CREEK			
10	182+00	195+00	C	2,000
	WEST BRANCH LLAGAS CREEK			
11A	182+00	220+00	C	2,900
11b	220+00	226+00	C	2,900
	226+00	297+00	C	2,700
	LIONS CREEK			
12	195+00	211+00	C	2,000
	211+00	235+00	C	900
	235+00	245+00	C	900
	245+00	285+00	C	800
	MOREY CHANNEL			
13	211+00	230+00	C	450
	230+00	245+00	C	200

CHANNEL REACH No.	STATION DESIGNATIONS		SOIL TYPE C=COHESIVE N.C.=NON-COHESIVE	Q DESIGN CAPACITY (C.F.S.)
	START	END		
13	217+00	233+00	C	280
	EAST LITTLE LLAGAS CREEK			
14	0+00	6+00	C	4,160
	6+00	32+00	C	3,630
	32+00	52+00	C	3,630
	52+00	121+50	C	2,940
	121+50	180+50	C	1,960
	CORRALLITOS CREEK			
	0+00	6+45	C	1,440
15A	6+45	10+00	C	1,440
	10+00	45+20	C	1.440
15b	45+20	77+50	C	1,440
	TENNANT CREEK			
	77+50	126+70	C	640
	EAST LITTLE LLAGAS CREEK			
16	180+50	220+85	C	660

NOTES

* Exceptions to the 1% Chance Flood are as follows:

Station 0+00 to 30+00, 10% Chance
30+00 to 64+00, 4% Chance
64+00 to 93+00, 2% Chance

TABLE 1

TABLE 2A

PROPOSED BRIDGES - PHYSICAL DATA

Reach No.	Station	Type	Length Ft.	Width Ft.	Area S.F.
1	47+00	County	220	32	7,040
2	85+00	Private	196	10	1,960
	127+40	Private	210	10	2,100
	182+00	State	210	32	6,720
3	238+00	County	168	32	5,376
	294+00	County	168	32	5,376
	379+00	County	168	32	5,376
4	441+00	County	140	32	4,480
	467+30	County	140	32	4,480
7A	88+50 - To 7B	Private	70	10	700
7B	104+40	Private	70	10	700
	111+10	Private	70	10	700
	116+30	Private	70	10	700
	121+20	Private	70	10	700
	125+60	Private	70	10	700
	128+90	Private	70	10	700
	131+10	Private	70	10	700
	132+70	Private	70	10	700
	134+90	Private	70	10	700
	137+90	Private	70	10	700
	139+40	Private	70	10	700
	141+80	Private	70	10	700
8B	201+35	Private	16	10	160
	213+35	Private	16	10	160
	222+55	Private	16	10	160

TABLE 2B

PROPOSED BRIDGES - PHYSICAL DATA

Reach No.	Station	Type	Length Ft.	Width Ft.	Area S.F.
9	58+00	County	Newly constructed bridge adequate		
	115+00	County	Newly constructed bridge adequate		
	147+00	County	112	32	3,584
	169+00	Railroad	112	NA	NA
10	170+00	State	112	100	11,200
	192+00	County	84	32	2,688
11A	193+00	County	98	32	3,136
	220+00	County	98	32	3,136
11B	296+20	County	84	32	2,688
12	206+00	County	84	32	2,688
	250+00	County	44	32	1,408
13	232+50	County	42	32	1,344
	244+00	County	42	32	1,344
14	168+00	Private	84	10	840
15B	56+00	Private	70	10	840

87,484

TABLE 3A

PROPOSED BOX CULVERTS - PHYSICAL DATA

Reach No.	Station	Waterway Opening	Height Ft.	Length Ft.	Concrete CY/LF	Concrete Total
7A	30+70	12' Double Box	9	40	3.15	126
	59+80	12' " "	9	40	3.15	126
	96+40	8' " "	8	40	1.62	65 - To 7B
						317
7B	130+20	8' Double Box	8	40	1.62	65
	144+00	8' " "	8	62	1.62	97
						162
8A	148+50	8' Double Box	8	60	1.62	97
	152+26	8' " "	8	80	1.62	130
	156+13	8' " "	8	80	1.62	130
	161+72	8' " "	8	76	1.62	123
	164+84	8' " "	8	50	1.62	81
	173+94	8' " "	7	60	1.56	94
	195+15	8' " "	7	100	1.56	156
						811
8B	226+65	8' Double Box	6	40	1.42	57
14	28+00*	Add 12' Triple Box	10	32	4.84	155
	98+00*	Add 12' Double Box	6	32	3.15	101
	126+50*	Add 10' " "	7	40	2.64	106
	173+30*	Add 12' " "	8	165	3.59	592
	180+50	Existing structure adequate				
						954
15A	45+20	10' Triple Box	8	40	3.40	136
15B	71+80	10' Triple Box	8	110	3.40	374
	84+50	8' Double Box	8	40	1.62	65
	99+50	8' " "	8	40	1.62	65
	126+50	8' " "	8	40	1.62	65
						569
16	197+80	8' Double Box	8	40	1.62	65
	209+80	8' " "	8	40	1.62	65
						130

*The recently built existing structure requires widening to conform to increased design channel width. It is proposed to add additional cells to the present structure as noted.

TABLE 3B

PROPOSED BOX CULVERTS - REACH 8A

ALLOCATION OF CONCRETE BETWEEN FEDERAL AND OTHER CONSTRUCTION

Station	Total Concrete C.Y.	Equivalent Federal Rectangular Channel				Concrete C.Y. Other Construction
		p	S	p ÷ S	Concrete C.Y.	
148+50	97	32	56	0.58	56	41
152+26	130	32	56	0.58	75	55
156+13	130	32	56	0.58	75	55
161+72	123	32	56	0.58	71	52
164+84	81	32	56	0.58	47	34
173+94	94	30	53	0.57	54	40
195+15	156	30	53	0.57	89	67
Total Concrete	811				467	344

Notes

1. Read in conjunction with Physical Data table.
2. p = perimeter of equivalent Federal rectangular channel in feet.
3. S = Sum of perimeter of walls, top and bottom slab for box culvert.

TABLE 4

SUMMARY OF LAND ACQUISITION REQUIREMENTS (CONSTRUCTION)

A = SCCW&FCD B = STATE PURCHASE

Reach No.	Average R/W Width (Feet)	R/W Needed (Acres)	Prior Acquisition (Acres)	by	Balance of R/W Remaining for Purchase (Acres)
2	276	74.77	40.761	A	34.01
3	244	110.36	86.719	A	23.64
4	230	62.94	47.507	A	15.43
5	193	10.54	7.67	B	2.87
6A	243	101.78	.006	A	101.77
6B	233	16.75	---		16.75
7A	153	30.07	---		30.07
7B	137	14.96	---		14.96
8A	42	4.95	---		4.95
8B	87	6.11	---		6.11
9	185	71.61	29.128 29.072	A B	13.41
10	163	9.73	.886	A	8.84
11A	166	14.48	7.770	A	6.71
11B	152	26.93	10.712	A	16.22
12	116	23.93	---		23.93
13 N & S	97	11.16	---		11.16
14	159	68.39	55.21	B	13.18
15A	139	12.36	---		12.36
15B	121	22.62	3.333	A	19.29
16	114	10.56	1.555		9.01
		705.00	320.329		384.67

TABLE 5

SELECTED RANGE OF BOX INLET DROP SPILLWAYS

Q	W	B	L_S	L_B	D	Concrete (Cu.Yd.)
17,000	70	70	15	100	6	1,350.7
9,000	50	50	12	75	5	824.1
5,000	38	38	9	57	3	488.0
3,000	32	32	7	48	3	270.1
2,000	25	25	6	38	2	237.0
1,000	16	16	5.5	24	5	174.3

TABLE 6

UNIT COSTS FOR CHANNEL IMPROVEMENTS AND LAND ACQUISITION

Item	(1975 Dollars) Unit Cost	Item	(1975 Dollars) Unit Cost
CHANNEL COSTS		OTHER CONSTRUCTION COSTS	
Channel Excavation	1.65 C.Y.		
Compacted Embankment (Channels)	0.50 C.Y.	State and County Bridges	24.00 S.F.
Drop Structures	200.00 C.Y.	Private Bridges	12.50 S.F.
Drainage Inlets	3,000.00 Ea.	RCB Culverts	145.00 C.Y.
Riprap	20.00 C.Y.	Relocation of Utilities	L.S.
Filter Stone	15.00 C.Y.	Railroad Bridge	300.00 L.F.
Seeding	650.00 Ac.		
Landscaping	L.S.		
Structural Excavation	3.00 C.Y.		
Rect. Concrete Channel	126.00 C.Y.	LAND PURCHASE	
Compacted Backfill	5.00 C.Y.	Creek Bottom	100.00 Ac.
Levee Embankment	1.25 C.Y.	Agricultural	3,500.00 Ac.
Site Preparation (Levees)	3.00 L.F.	Residential (Low Value)	8,000.00 Ac.
		Residential (Medium Value)	10,000.00 Ac.
		Residential (High Value)	13,000.00 Ac.
		School	13,000.00 Ac.
		Industrial	20,000.00 Ac.
		Dwellings	25,000.00 Ea.

TABLE 7A

UTILITIES RELOCATION

Reach No.	Station	Utility	Estimated Relocation Cost 1966	Estimated Relocation Cost 1975	
1	47+50	Raising Bloomfield Road	$12,230	$19,600	← PART OF BRIDGE C
2	107+00	8" buried steel pipe	1,200	1,900	8,200
	107+50	One power pole	300	500	
	127+30	Well, pump and Pump House	3,300	5,300	
	127+30	Power pole	300	500	
	176+00	6" gas main buried	1,000	1,600	
3	192+50	Power pole	300	500	
	228+10	Well and pump	3,000	4,800	
	231+50	Well and pump	3,000	4,800	
	238+80	Power pole	300	500	
	240+00	Barn	12,000	19,200	
	240+50	Power pole	300	500	
	*	Relocate Hosclaw Road	21,400	34,200	
	254+70	Power pole	300	500	
	255+90	Power pole	300	500	
	298+00	4" gas main	500	800	
	298+50	Power pole	300	500	
4	413+00	Well and pump	3,000	4,800	6,400
	413+10	6" steel pipe	1,000	1,600	
	467+50	Utility pole	300	500	
5	505+00	Utility pole	300	500	
6A	550+00	4" gas main buried	500	800	
	550+50	3" water line	450	700	
	671+00	2" gas main buried	350	500	
	682+30	6" suspended irrigation pipe	1,000	1,600	
	686+00	4" gas main buried	500	800	
	686+20	Buried telephone cable	1,000	1,600	

TABLE 7B

UTILITIES RELOCATION

Reach No.	Station	Utility	Estimated Relocation Cost 1966	1975
7B	96+50	2" gas line (P.G. & E.)	$ 350	$ 600
	104+40	12" sewer line	3,000	4,800
	106+50	12" sewer line	5,300	8,500
	129+50 (Spring)	2" gas line (P.G. & E.) 4" water line 6" sewer line	3,000	4,800
	144+00 (Dunne)	4" gas line 4" water line	3,000	4,800
8A	148+80 (5th)	6" water line 6" sewer line 4" gas line	3,000	4,800
	152+47 (4th)	4" water line 6" sewer line 2" gas line	3,000	4,800
	156+13 (3rd)	6" water line 6" sewer line	3,000	4,800
	161+72 (Del Monte)	6" sewer line 6" water line	3,000	4,800
	164+84 (Warren)	6" sewer line 4" water line 4" gas line	3,000	4,800
	173+94 (Main)	8" water line 4" water line 6" sewer line	3,000	4,800
	194+65 (Hale-Wright)	8" water line 4" gas line 6" sewer line	3,000	4,800
8B	222+55 (Private Bridge)	2" water line	350	600

TABLE 7C

UTILITIES RELOCATION

Reach No.	Station	Utility	Estimated Relocation Cost 1966	Estimated Relocation Cost 1975
9	63+00	2 - 21" sewer siphons	$10,000	$16,000
	168+00	Micro-wave cable	7,500	12,000
	168+00	4" gas line	500	800
10	192+00	2" gas line	500	800
11A	193+00	2" gas line	500	800
12	205+00	2" gas line	500	800
14	27+80	4" gas main (P.G. & E.) (2)	1,000	1,600
	97+50	3" water line	400	600
		1" water line	300	500
		Utility pole	300	500
	98+60	2" gas pipe (P.G. & E.)	350	400
	139+00	4" irrigation line	200	300
	173+20	2" gas pipe	350	600
		Utility pole	300	500
	180+00	Utility pole	300	500
15A	10+00	10" irrigation line	250	400
15B	58+00	12" irrigation line	300	500
	65+00	12" irrigation line	300	500
	119+00	Utility pole	300	500
16	198+00	Utility pole	300	500

TABLE 8 LLAGAS CREEK SUMMARY OF ESTIMATED COSTS

(All Amounts Rounded to Nearest $100)

REACH NO.	CAPITAL COSTS									AVERAGE ANNUAL COSTS			
	INSTALLATION COSTS			OTHER INSTALLATION COSTS					GRAND TOTAL	CAPITAL COSTS AMORTIZED	M & O		TOTAL ANNUAL EQUIVALENT
	Construct	Eng.1/	Total	Land	Admin.2/	Construct3/	Eng.3/	Total			Mi.	$	
2	3,409,900	852,500	4,262,400	209,100	31,400	314,900	78,700	634,100	4,896,500	165,900	2.23	4,500	170,400
3	3,664,500	916,100	4,580,600	442,900	66,400	621,100	155,300	1,285,700	5,866,300	198,800	3.73	7,500	206,300
4	3,119,500	779,900	3,899,400	540,900	81,100	315,500	78,900	1,016,400	4,915,800	166,500	2.26	4,500	171,000
5	546,000	136,500	682,500	80,100	12,000	33,000	8,300	133,400	815,900	27,600	0.45	900	28,500
6A	617,800	154,500	772,300	747,400	112,100	96,900	24,200	980,600	1,752,900	59,400	3.44	6,900	66,300
6B	92,800	23,200	116,000	140,100	21,000	15,900	4,000	181,000	297,000	10,100	0.59	1,200	11,300
7A	854,900	213,700	1,068,600	364,900	54,700	106,300	26,600	552,500	1,621,100	54,900	1.61	3,200	58,100
7B	181,700	45,400	227,100	202,300	30,300	171,800	43,000	447,400	674,500	22,900	0.90	1,800	24,700
8A	920,400	230,100	1,150,500	104,800	15,700	104,400	26,100	251,000	1,401,500	47,500	0.97	1,900	49,400
8B	182,300	45,600	227,900	92,800	13,900	36,500	9,100	152,300	380,200	12,900	0.61	1,200	14,100
9	955,700	238,900	1,194,600	768,200	115,200	256,200	64,100	1,203,700	2,398,300	81,300	3.20	6,400	87,700
10	300,100	75,000	375,100	134,100	20,100	397,300	99,300	650,800	1,025,900	34,800	0.49	1,000	35,800
11A	288,000	72,000	360,000	199,200	29,900	193,200	48,300	470,600	830,600	28,100	0.72	1,400	29,500
11B	511,300	127,800	639,100	282,800	42,400	113,200	28,300	466,700	1,105,800	37,500	1.45	2,900	40,400
12	446,600	111,700	558,300	256,700	38,500	159,500	39,900	494,600	1,052,900	35,700	1.70	3,400	39,100
13S	65,400	16,400	81,800	82,100	12,300	91,400	22,900	208,700	290,500	9,800	0.64	1,300	11,100
13N	38,500	9,600	48,100	42,200	6,300	8,100	2,000	58,600	106,700	3,600	0.30	600	4,200
14	788,300	197,000	985,300	719,700	108,000	272,100	68,000	1,167,800	2,153,100	72,900	3.54	7,100	80,000
15A	515,800	129,000	644,800	132,000	19,800	42,800	10,700	205,300	850,100	28,800	0.73	1,500	30,300
15B	137,200	34,300	171,500	248,000	37,200	150,000	37,500	472,700	644,200	21,800	1.54	3,100	24,900
16	111,000	27,800	138,800	111,300	16,700	42,200	10,600	180,800	319,600	10,800	0.76	1,500	12,300
SUB-TOTAL	17,747,700	4,437,000	22,184,700	5,901,600	885,000	3,542,300	885,800	11,214,700	33,399,400	1,131,600	-	63,800	1,195,400
1	580,000*	145,000	725,000	-	-	213,000	53,300	266,300	991,300	33,600	1.21	2,400	36,000
CHES. DAM	2,040,000	660,000**	2,700,000	2,662,000	399,300	1,513,000	378,300	4,952,600	7,652,600	259,300	-	60,000	319,300
TOTAL	20,367,700	5,242,000	25,609,700	8,563,600	1,284,300	5,268,300	1,317,400	16,433,600	42,043,300	1,424,500		126,200	1,550,700

* Actual cost of construction. ** Includes $160,000 for special engineering investigation.

1/ 75% OF THIS WILL BE CLASSIF. AS ENGINEERING, 25% AS "OTHER INSTALL. SERVICES"

2/ SURVEYS, LEGAL FEES, ETC.

DMJM COST SUMMARY

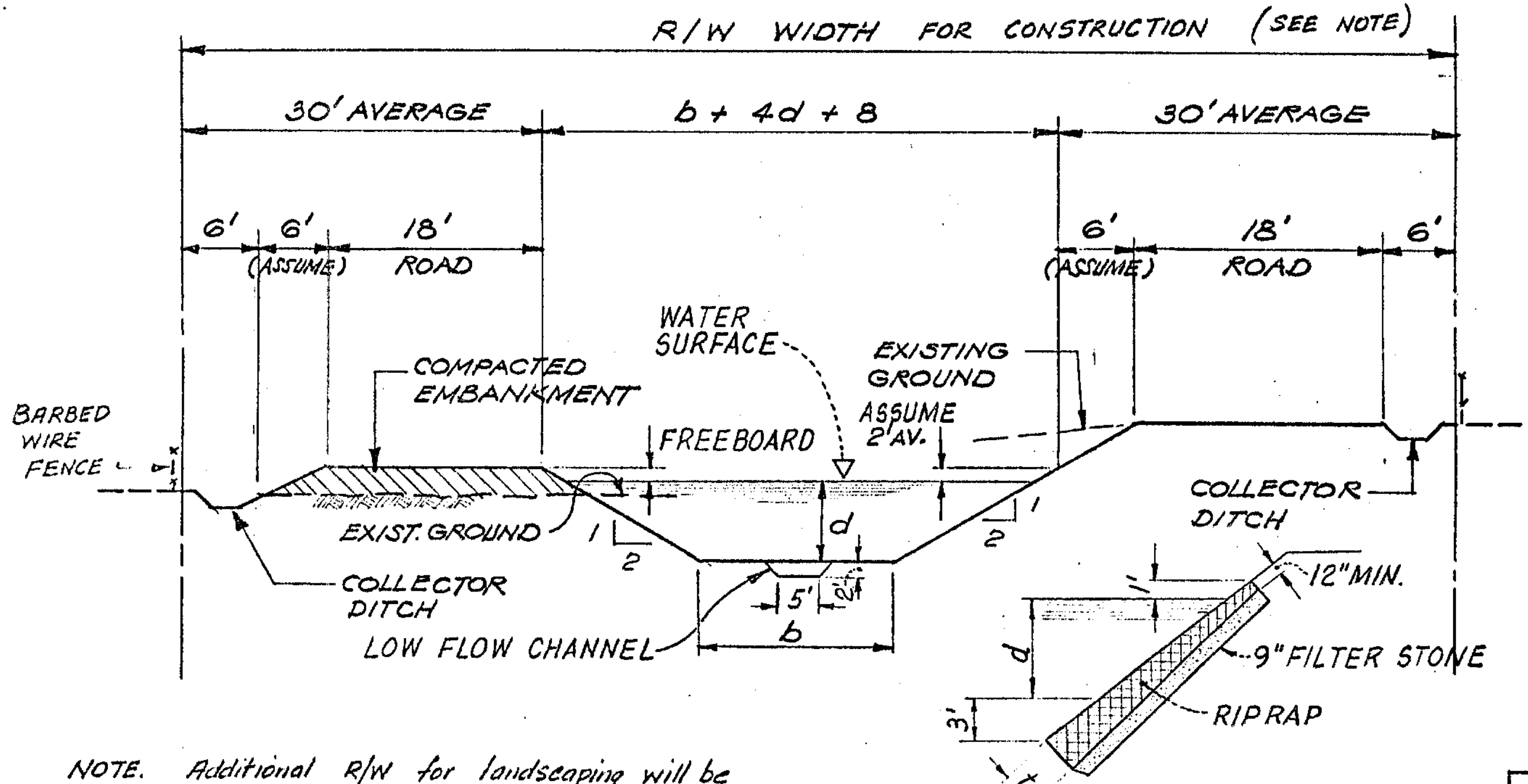
These costs were subdivided further in order to complete the work plan supplement.

See P. VIII - 2

1% of const. would be 20,000

FIGURE 2
CHANNEL SCHEMATIC
LLAGAS CREEK WATERSHED PROJECT
SANTA CLARA COUNTY, CALIFORNIA

FIGURE 3
CHANNEL SCHEMATIC
PLANNED CHANNEL MODIFICATION
LLAGAS CREEK WATERSHED PROJECT
SANTA CLARA COUNTY, CALIFORNIA



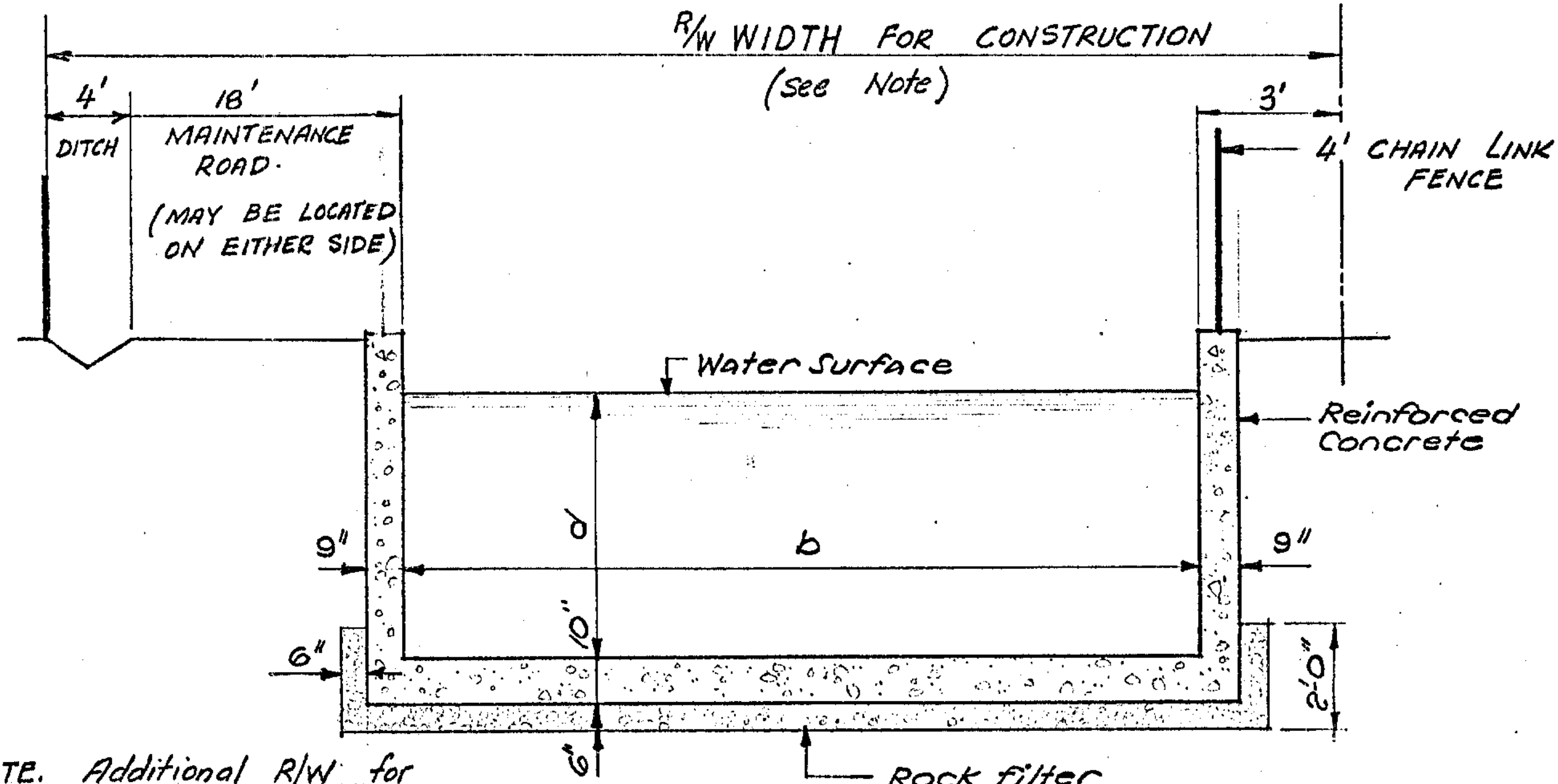
NOTE. Additional R/W for landscaping will be purchased according to the approved landscaping plan.

RIPRAP LINING DETAIL

TYPICAL SECTION ~ TRAPEZOIDAL CHANNEL

NO SCALE

PLATE 2



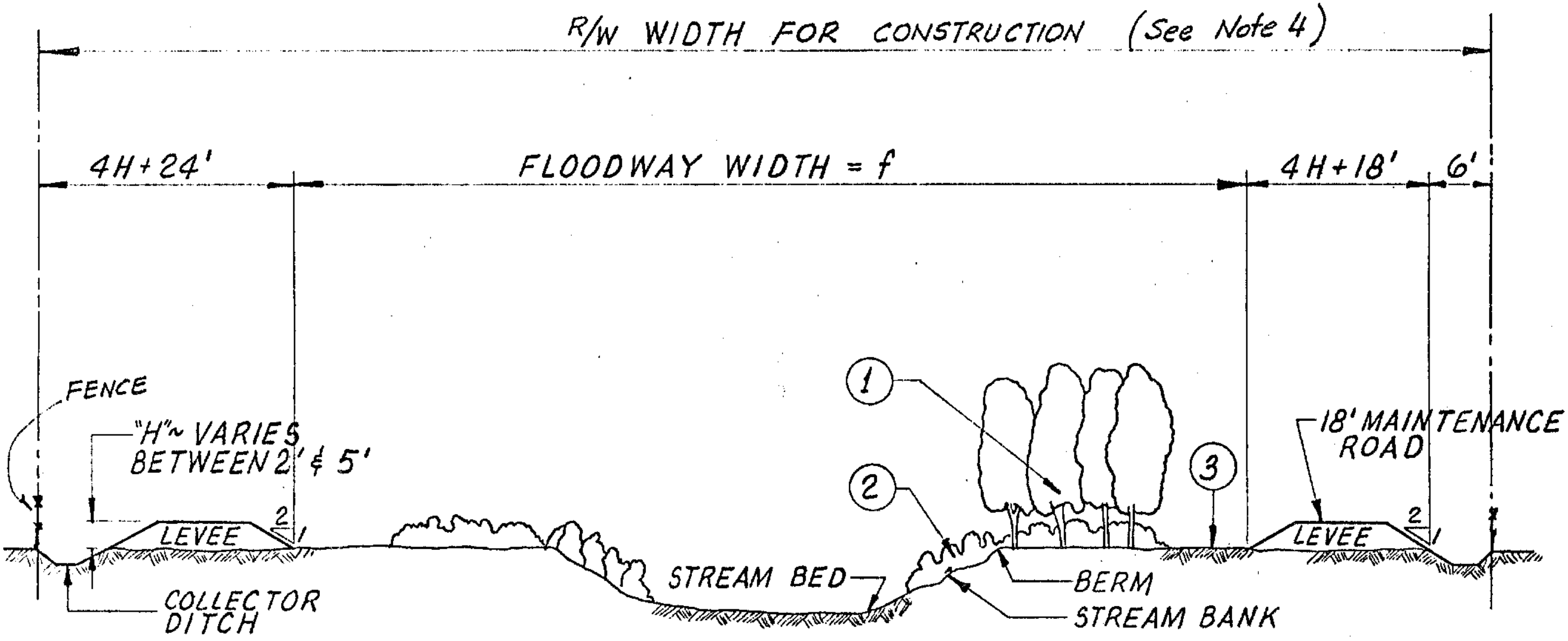
NOTE. Additional R/W for landscaping will be purchased according to the approved landscaping plan.

TYPICAL SECTION

CONCRETE LINED RECTANGULAR CHANNELS

NO SCALE

PLATE 3



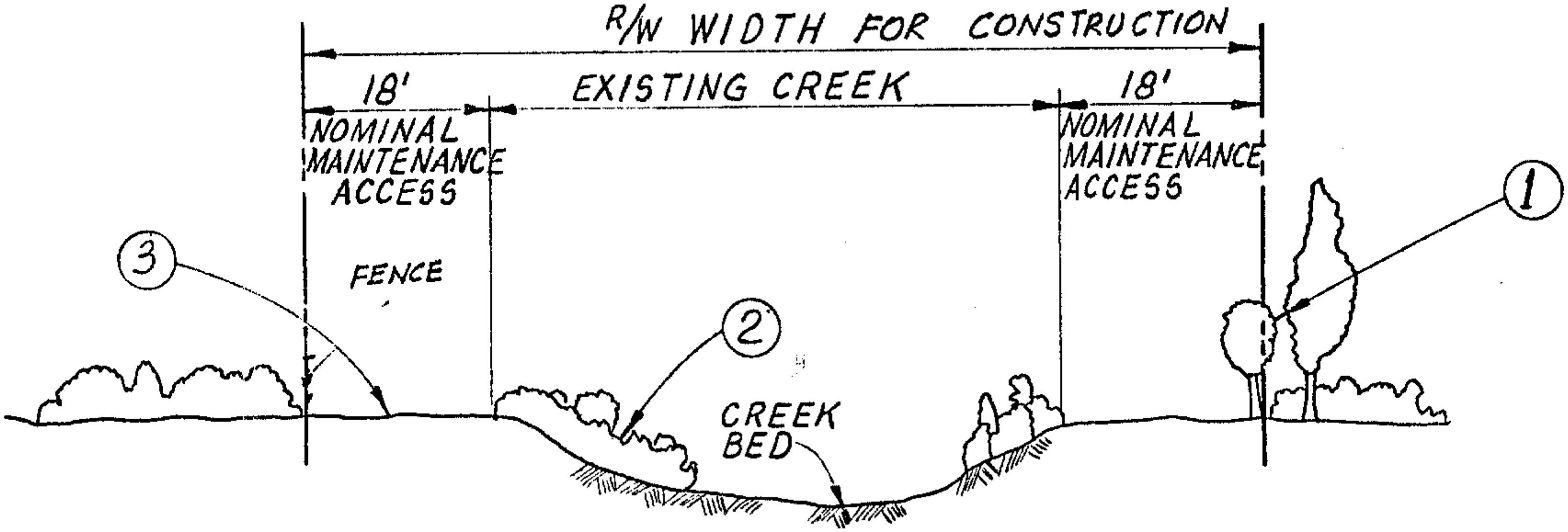
NOTES:

1. EXISTING TREES TO REMAIN OR TO BE REPLANTED AS RECOMMENDED IF REMOVAL IS NECESSARY.
2. EXISTING VEGETATION TO REMAIN OR TO BE REPLANTED AS RECOMMENDED AND MAINTAINED BY MECHANICAL METHODS.
3 NATURAL GROUND LINE.
4. ADDITIONAL R/W FOR LANDSCAPING WILL BE PURCHASED ACCORDING TO THE APPROVED LANDSCAPE PLAN

TYPICAL SECTION ~ LEVEE CONTROLLED FLOODWAY

NO SCALE

PLATE 4

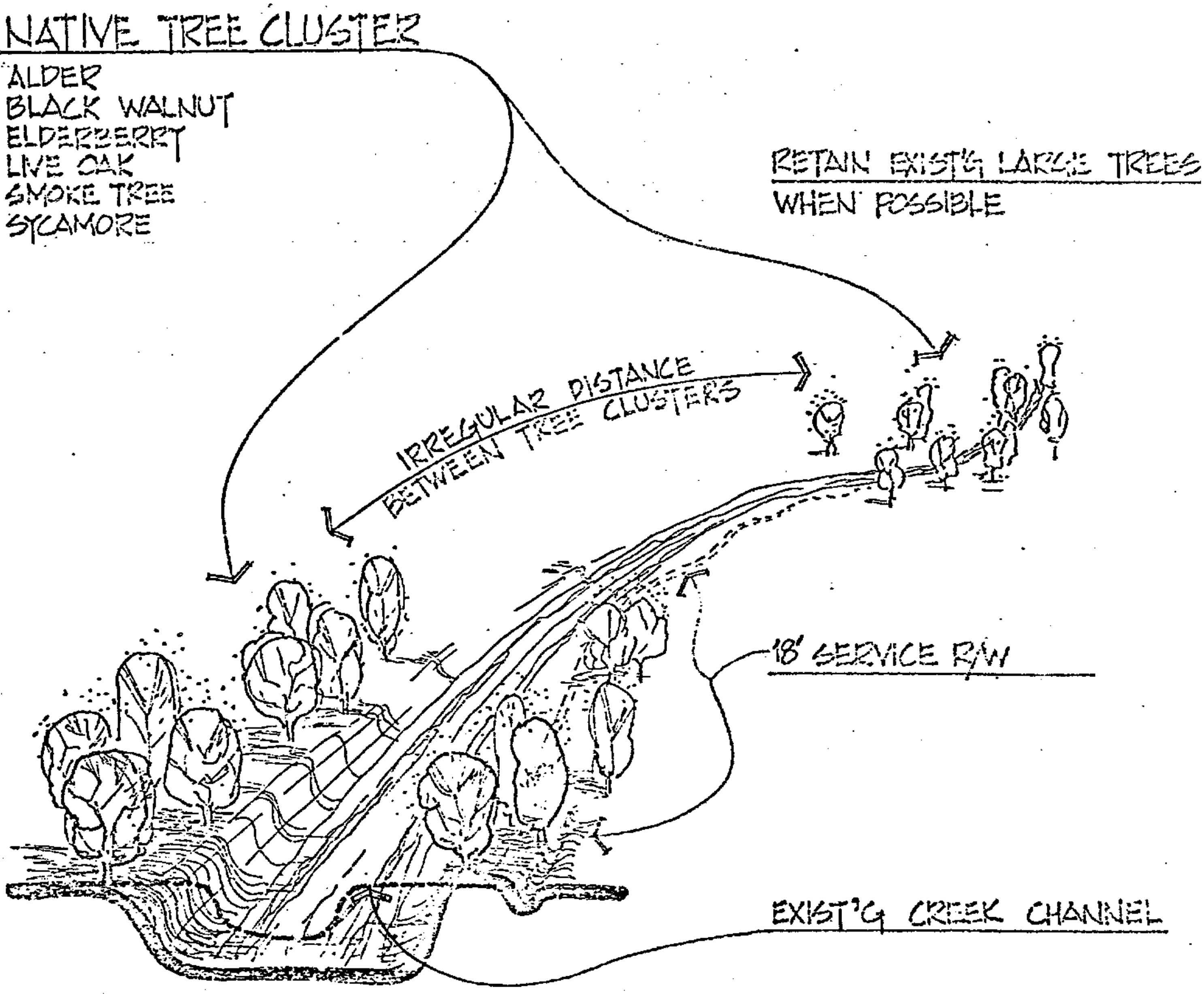

R/W WIDTH FOR CONSTRUCTION
18'
EXISTING CREEK
18'
NOMINAL MAINTENANCE ACCESS
NOMINAL MAINTENANCE ACCESS
①
③
FENCE
②
CREEK BED

NOTES:

1. EXISTING TREES TO REMAIN OR TO BE REPLANTED AS RECOMMENDED IF REMOVAL IS REQUIRED TO PERMIT PASSAGE OF MAINTENANCE VEHICLES.
2. EXISTING BANK VEGETATION TO REMAIN AND TO BE MAINTAINED BY MECHANICAL METHODS.
3. CLEAR OVERBANK VEGETATION TO THE EXTENT NECESSARY FOR MAINTENANCE.
4. ADDITIONAL R/W FOR LANDSCAPING WILL BE PURCHASED ACCORDING TO THE APPROVED LANDSCAPING PLAN.

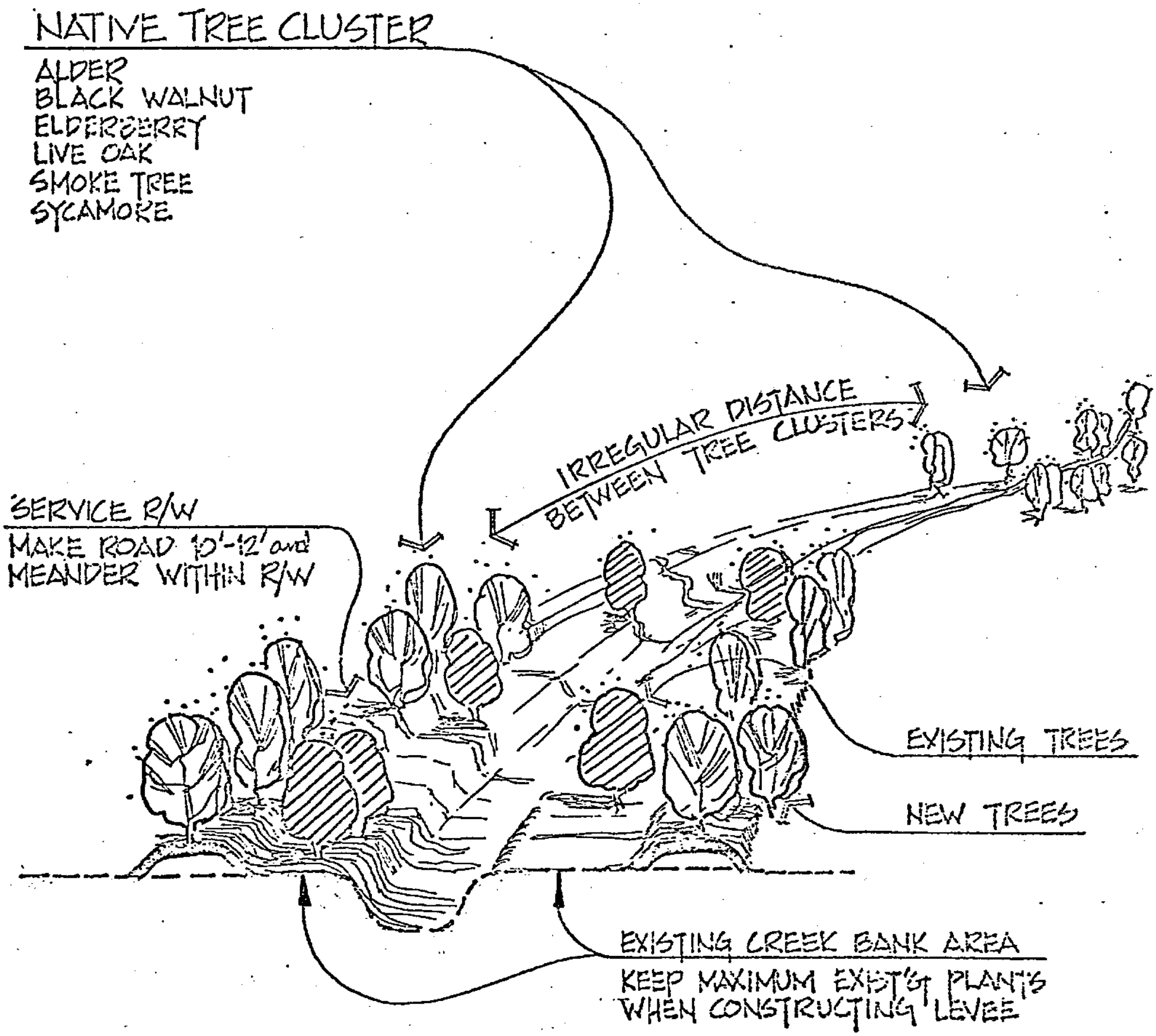
TYPICAL SECTION ~ NATURAL CREEK

NO SCALE



LANDSCAPE CONCEPT
EXCAVATED CHANNEL
LLAGAS CREEK

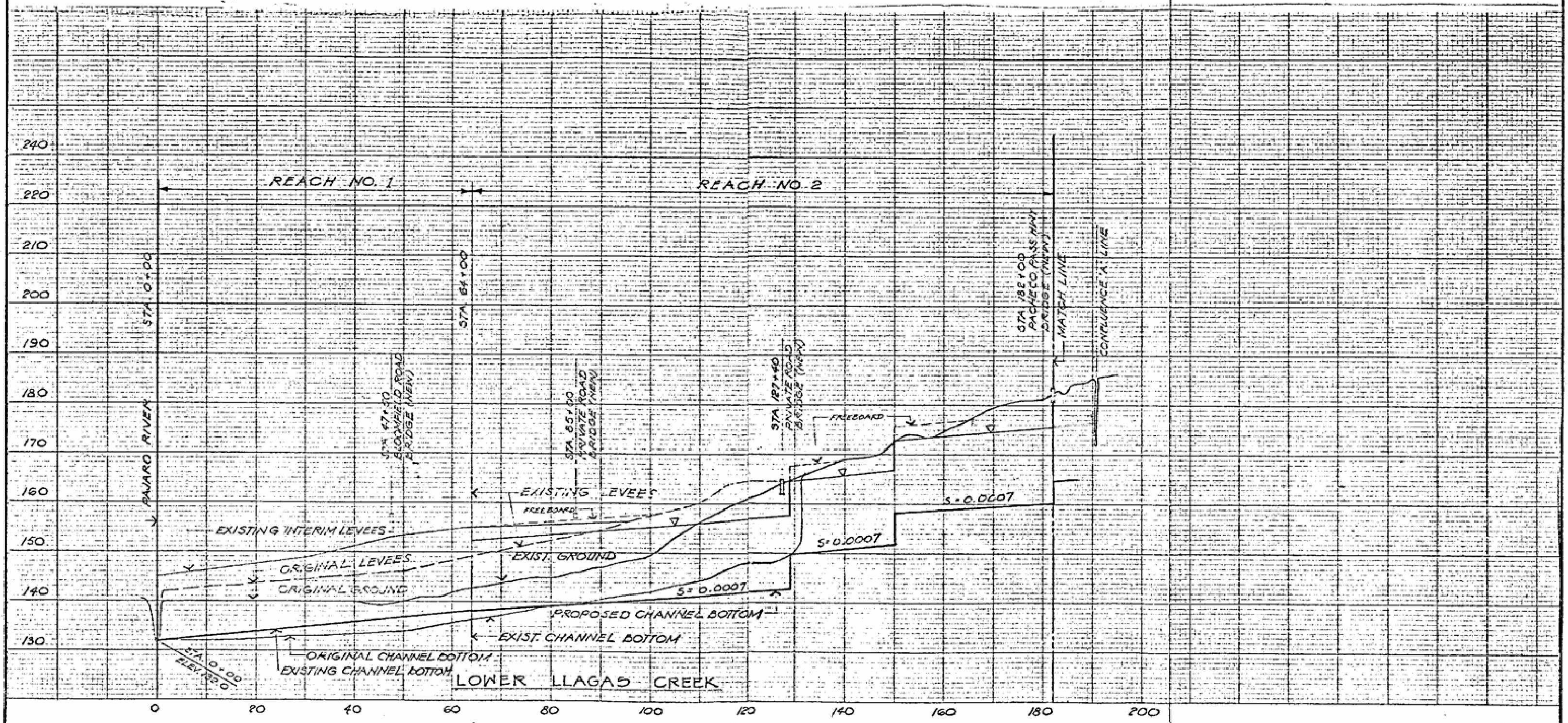
PLATE 7


NATIVE TREE CLUSTER
ALDER
BLACK WALNUT
ELDERBERRY
LIVE OAK
SMOKE TREE
SYCAMORE
IRREGULAR DISTANCE BETWEEN TREE CLUSTERS
SERVICE R/W
MAKE ROAD 10'-12' and MEANDER WITHIN R/W
EXISTING TREES
NEW TREES
EXISTING CREEK BANK AREA
KEEP MAXIMUM EXIST'G PLANTS WHEN CONSTRUCTING LEVEE

LANDSCAPE CONCEPT
LEVEE CHANNEL
LLAGAS CREEK

PLATE 8

70



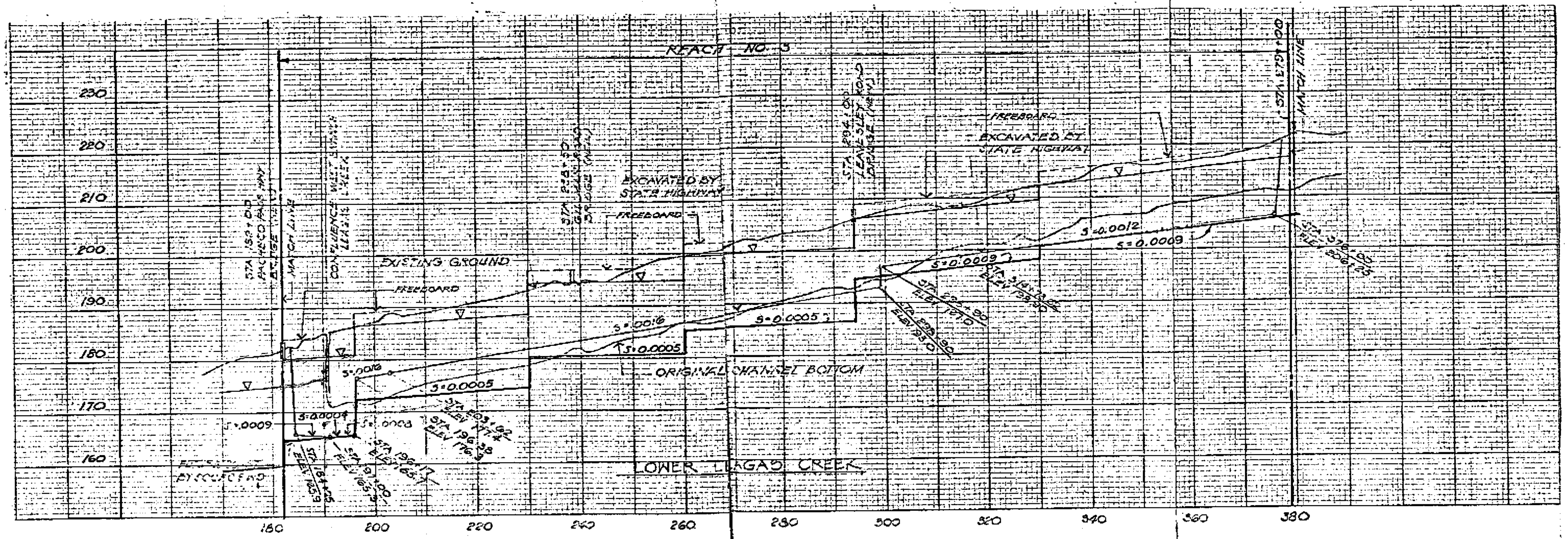
LLAGAS CREEK

WORK PLAN

REVISED PROFILE

REACH No. 1 & 2

PLATE 9



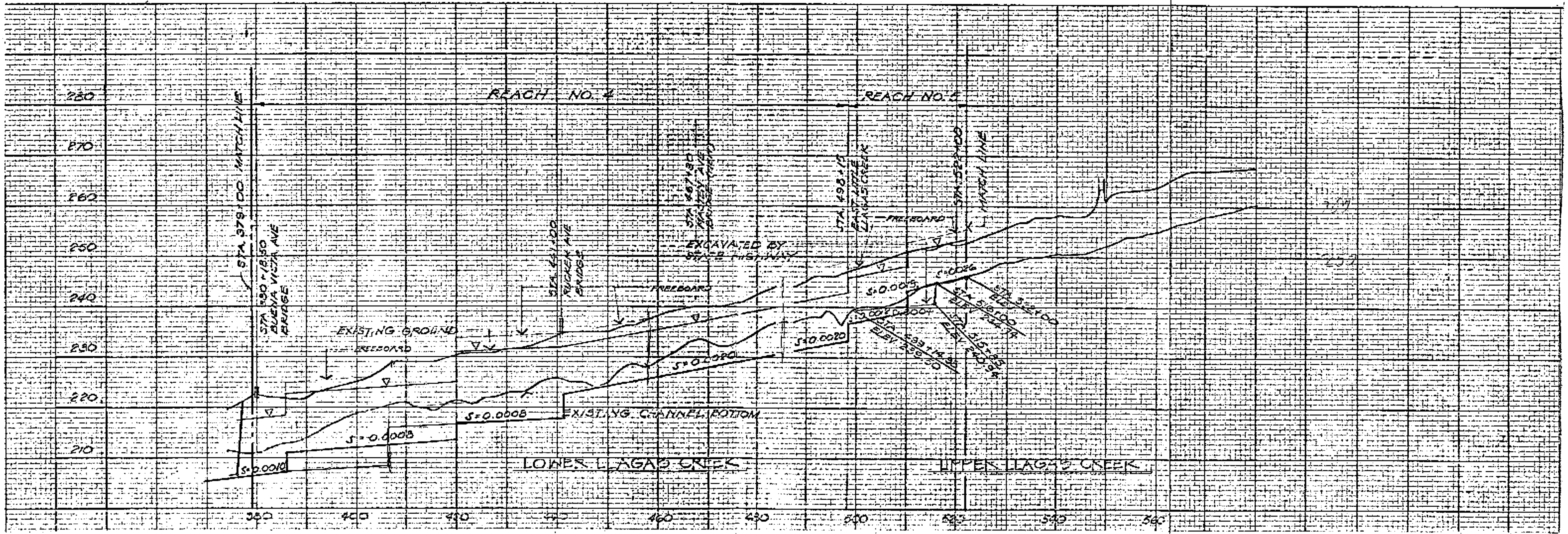
LLAGAS CREEK

WORK PLAN

REVISED PROFILE

REACH No. 3

PLATE 10

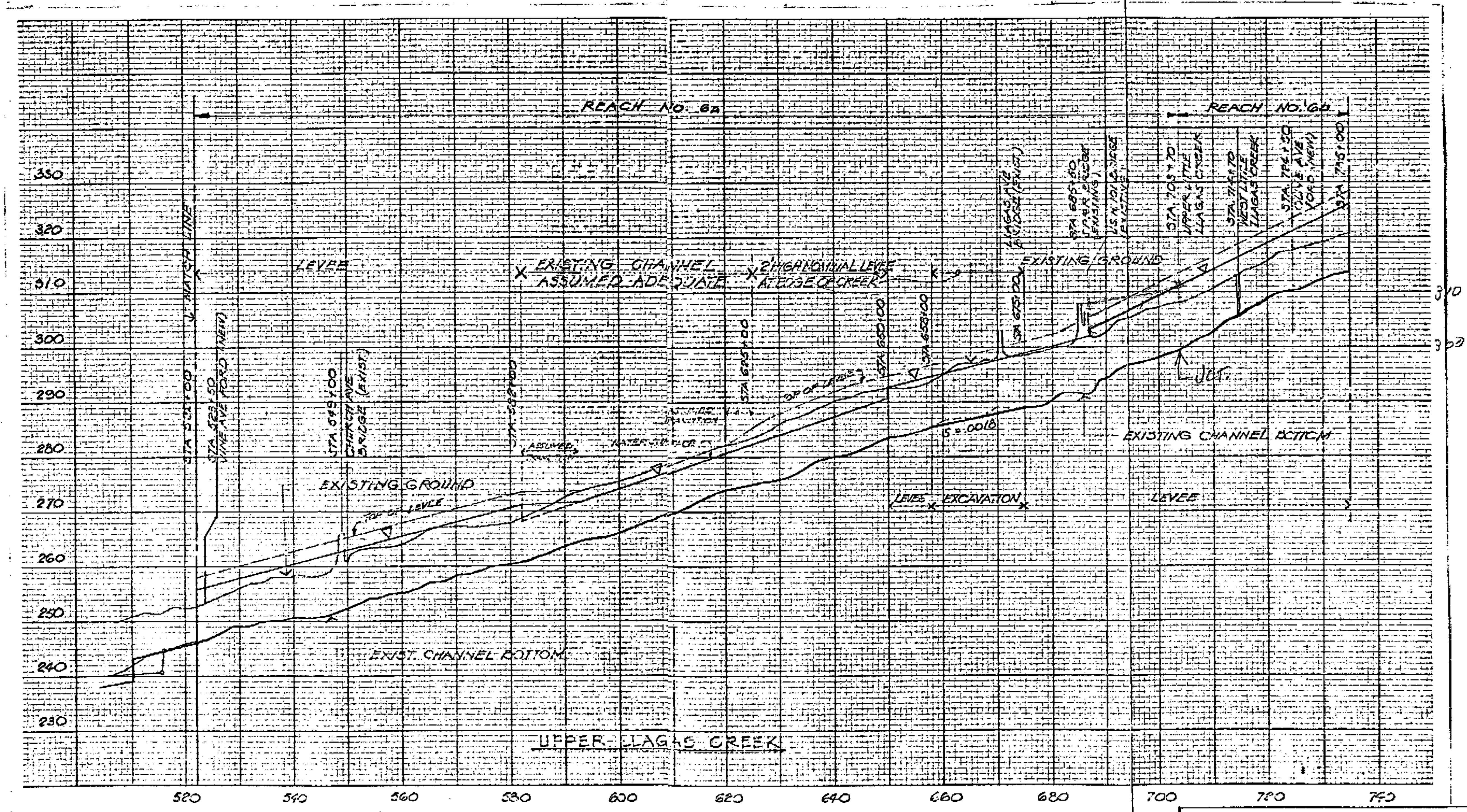


LLAGAS CREEK

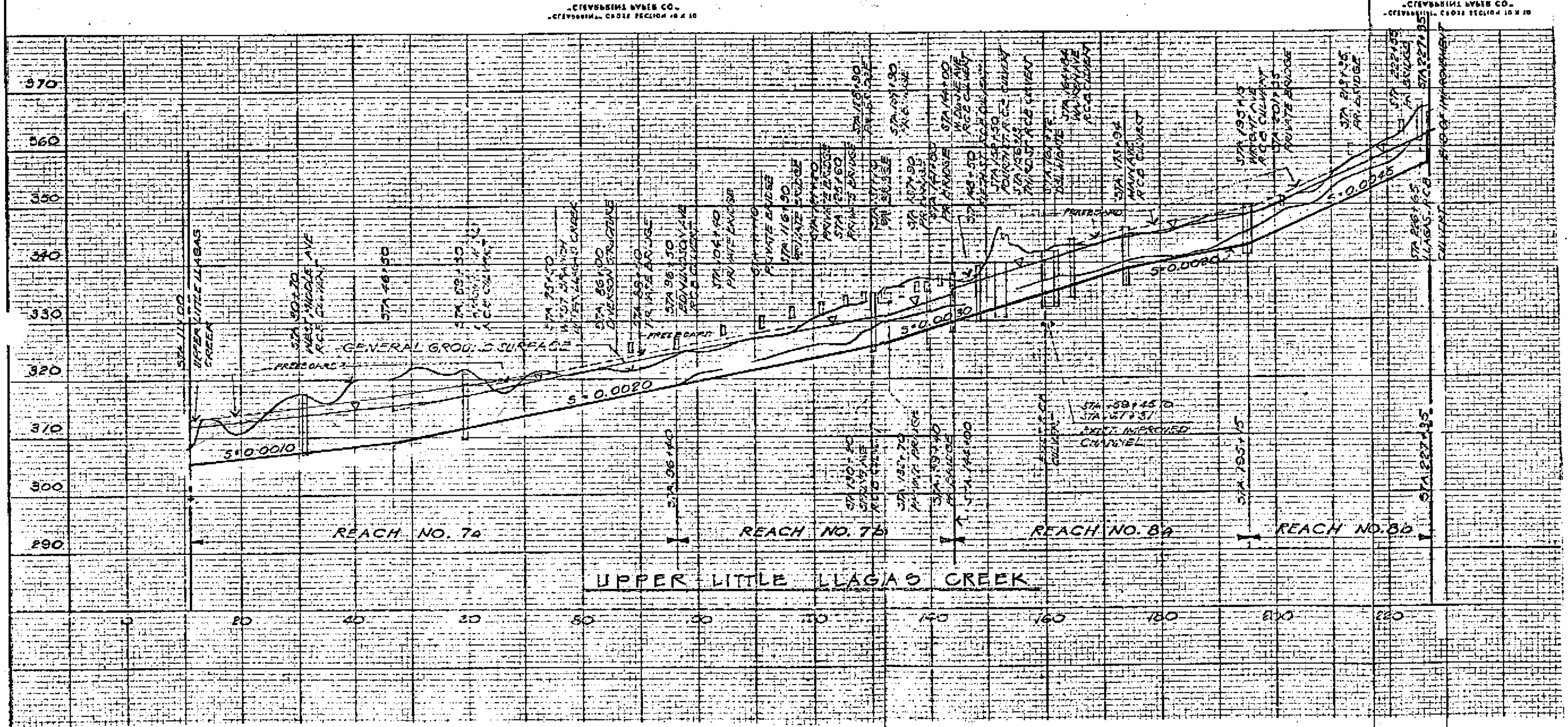
WORK PLAN

REVISED PROFILE

REACH No. 4 & 5



LLAGAS CREEK
WORK PLAN
REVISED PROFILE
REACH No. 6a & 6b



LLAGAS CREEK

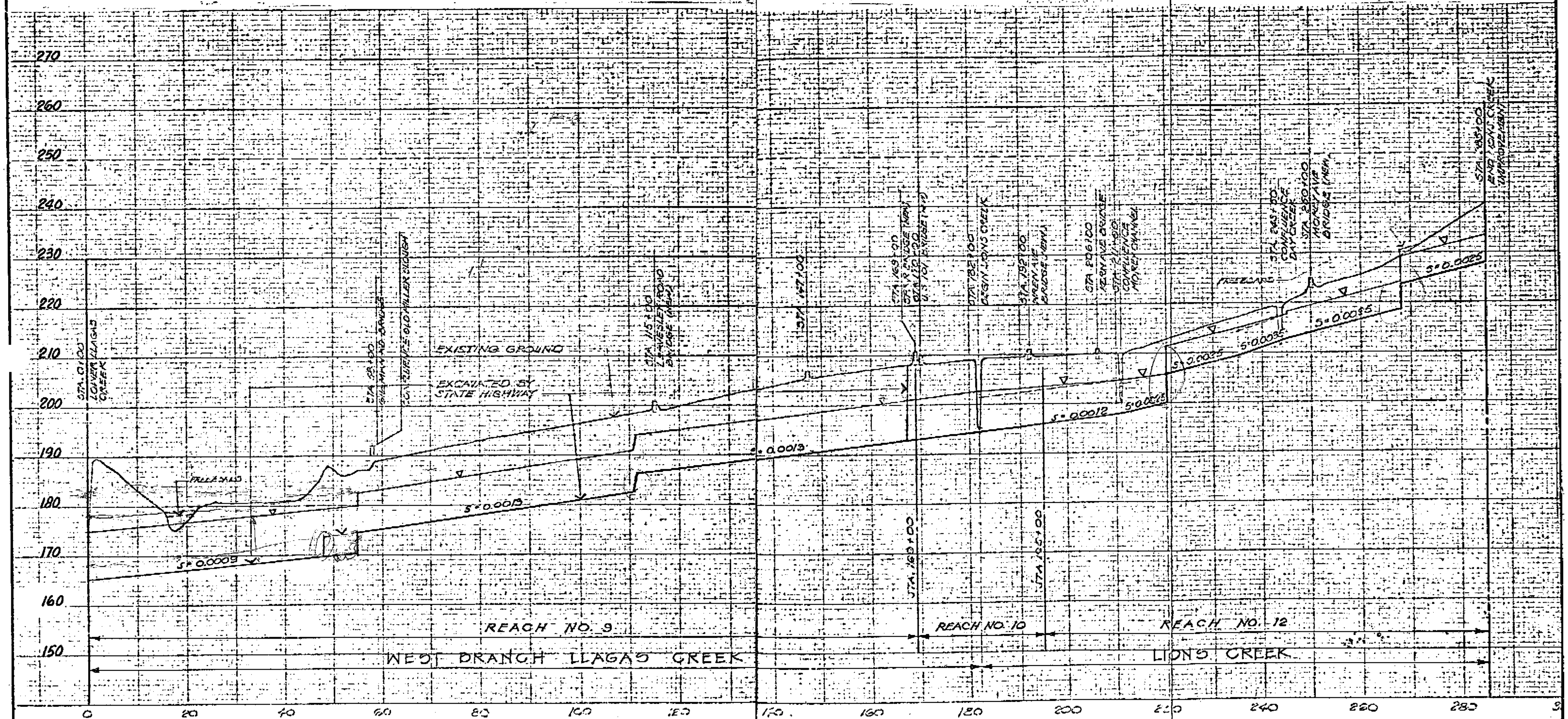
WORK PLAN

REVISED PROFILE

REACH No. 7a,7b,8a & 8b

PLATE 13

75


270
260
250
240
230
220
210
200
190
180
170
160
150
STA. 0+00 LOWER LLAGAS CREEK
FREEBOARD
S=0.0009
STA. 58+00 GILMAN RD. BRIDGE
CONFLUENCE OLD MILLER SLOUGH
EXISTING GROUND
EXCAVATED BY STATE HIGHWAY
S=0.0013
STA. 115+00 LEAVESLEY ROAD BRIDGE (NEW)
S=0.0013
STA. 147+00
STA. 169+00 S.P.R.R. BRIDGE (NEW) STA. 170+20 U.S. 101 BRIDGE (NEW)
STA. 182+00 ORIGIN LIONS CREEK
STA. 192+00 WREN AVE. BRIDGE (NEW)
STA. 206+00 KERN AVE BRIDGE
STA. 211+00 CONFLUENCE MOREY CHANNEL
S=0.0012
S=0.0015
S=0.0035
S=0.0035
S=0.0035
FREEBOARD
STA. 245+00 CONFLUENCE DAY CREEK
STA. 250+00 MOREY AVE BRIDGE (NEW)
S=0.0025
STA. 285+00 END LIONS CREEK IMPROVEMENT
STA. 169+00
STA. 195+00
REACH NO. 9
REACH NO. 10
REACH NO. 12
WEST BRANCH LLAGAS CREEK
LIONS CREEK
0
20
40
60
80
100
120
140
160
180
200
220
240
260
280
3

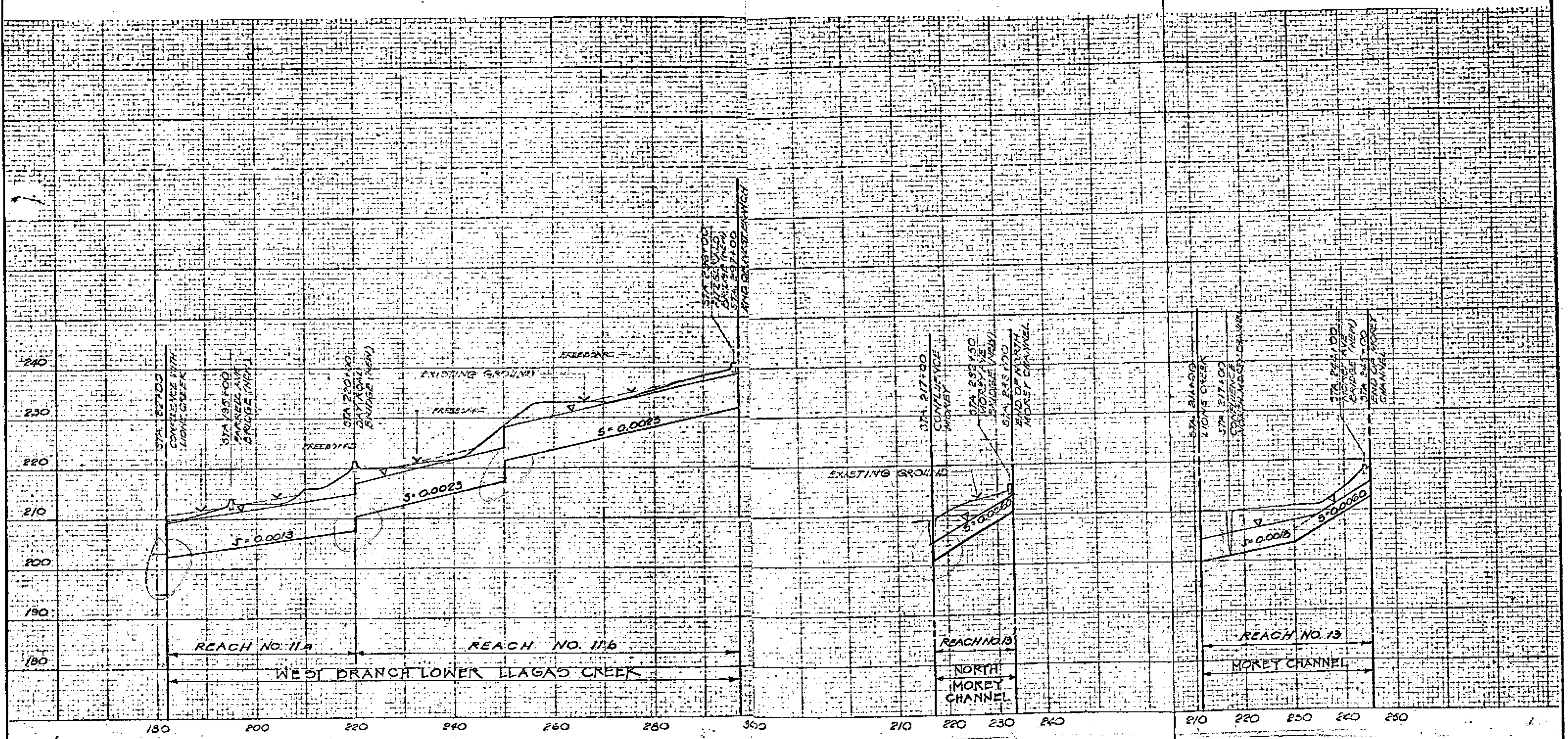
LLAGAS CREEK

WORK PLAN

REVISED PROFILE

REACH No. 9, 10 & 12

PLATE 14



LLAGAS CREEK

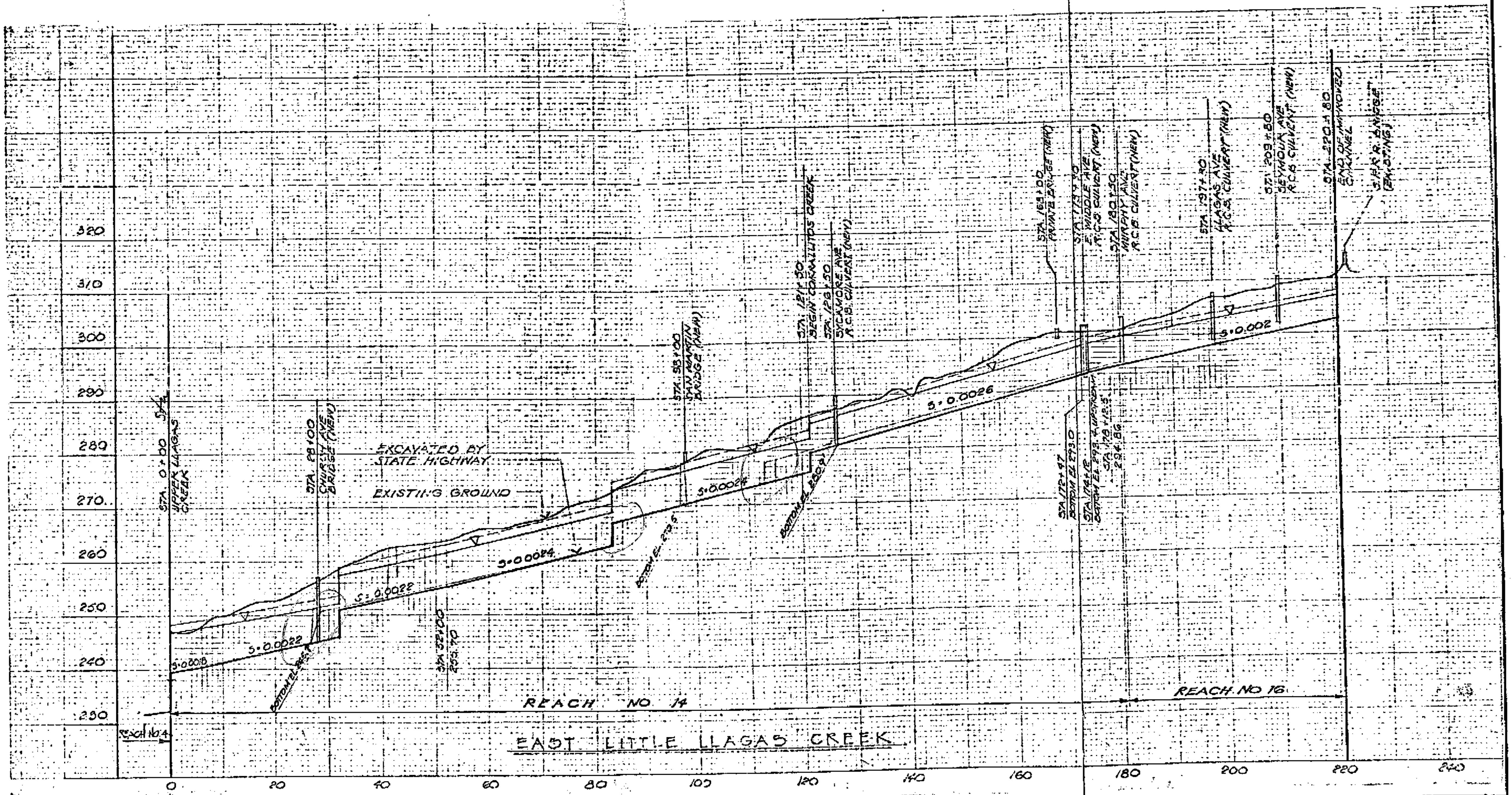
WORK PLAN

REVISED PROFILE

REACH No. 11a, 11b & 13

PLATE 15

77

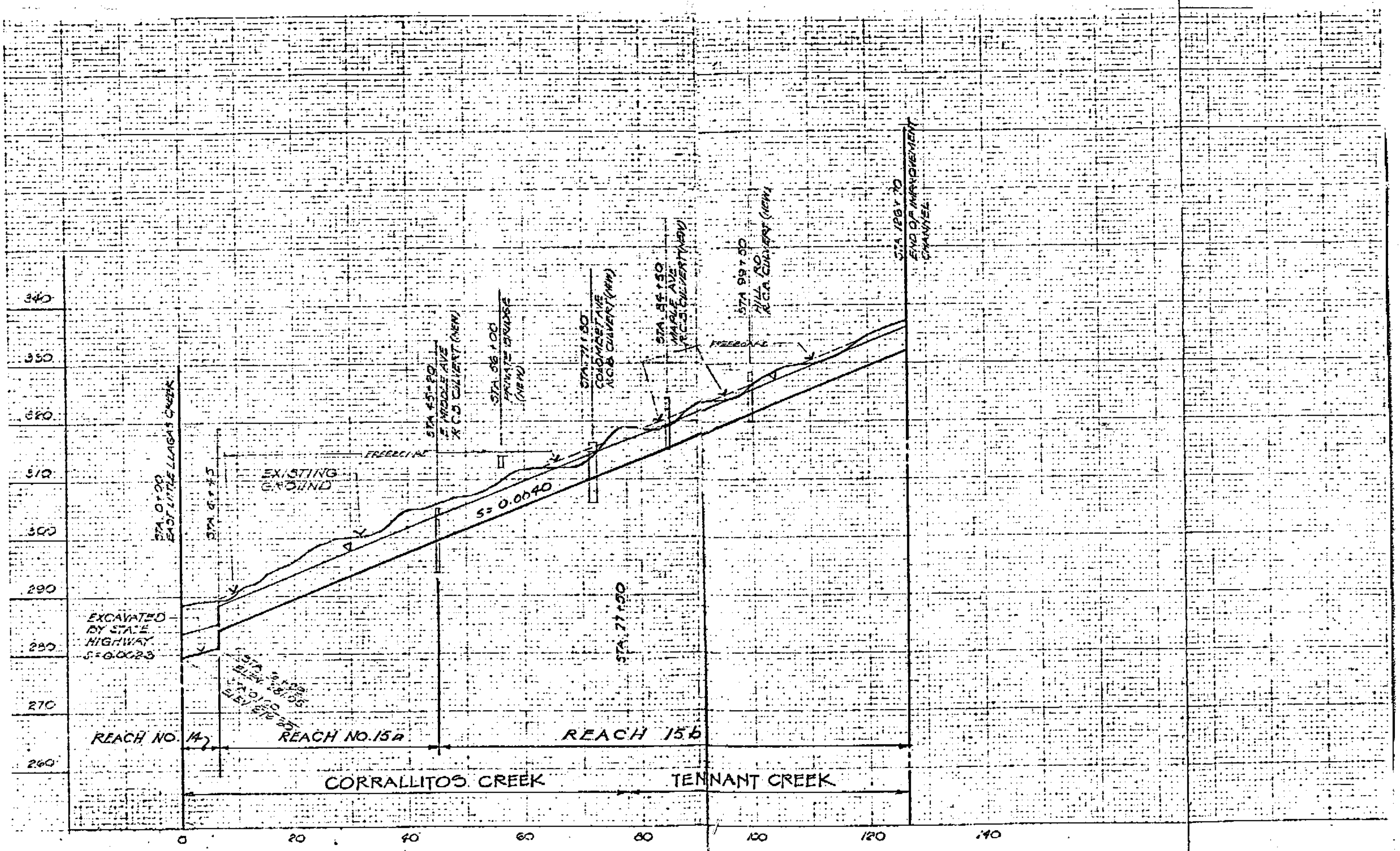

320
310
300
290
280
270
260
250
240
230
STA. 0+00 UPPER LLAGAS CREEK
STA. 28+00 CHURCH AVE BRIDGE (NEW)
EXCAVATED BY STATE HIGHWAY
EXISTING GROUND
S=0.0018
S=0.0022
S=0.0022
S=0.0024
S=0.0024
S=0.0026
S=0.002
BOTTOM EL 245.1
STA 32+00 253.70
BOTTOM EL 273.5
STA. 93+00 SAN MARTIN BRIDGE (NEW)
STA. 121+50 BEGIN CORRALITOS CREEK
STA. 126+50 SYCAMORE AVE R.C.B. CULVERT (NEW)
BOTTOM EL 280.9
STA. 169+00 PRIVATE BRIDGE (NEW)
STA. 173+70 E. MIDDLE AVE R.C.B. CULVERT (NEW)
STA. 180+50 MURPHY AVE R.C.B. CULVERT (NEW)
STA. 197+80 LLAGAS AVE R.C.B. CULVERT (NEW)
STA. 209+80 SEYMOUR AVE R.C.B. CULVERT (NEW)
STA. 220+80 END OF IMPROVED CHANNEL
S.P.R.R. BRIDGE (EXISTING)
STA 172+47 BOTTOM EL 293.0
STA 174+12 BOTTOM EL 293.4 UPSTREAM
STA 178+12.5 294.86
REACH NO. 4
REACH NO 14
REACH NO 16
EAST LITTLE LLAGAS CREEK
0
20
40
60
80
100
120
140
160
180
200
220
240

LLAGAS CREEK

WORK PLAN

REVISED PROFILE

REACH No. 14 & 16


340
330
320
310
300
290
280
270
260
0
20
40
60
80
100
120
140
STA. 0+00 EAST LITTLE LLAGAS CREEK
STA. 6+45
EXISTING GROUND
FREEBOARD
EXCAVATED BY STATE HIGHWAY S=0.0023
STA. 6+95 ELEV. 281.05 ELEV. 278.87
STA. 45+20 E. MIDDLE AVE R.C.B. CULVERT (NEW)
STA. 56+00 PRIVATE BRIDGE (NEW)
STA. 71+80 COLOMBET AVE R.C.B. CULVERT (NEW)
S= 0.0040
STA. 71+50
STA. 84+50 MAPLE AVE R.C.B. CULVERT (NEW)
FREEBOARD
STA. 99+50 HILL RD R.C.A. CULVERT (NEW)
STA. 126+70 END OF IMPROVEMENT CHANNEL
REACH NO. 14
REACH NO. 15a
REACH 15b
CORRALLITOS CREEK
TENNANT CREEK

LLAGAS CREEK

WORK PLAN

REVISED PROFILE

REACH No. 14, 15a & 15b

PLATE 17

LLAGAS CREEK - MODIFIED WORK PLAN

HYDRAULIC DESIGN SUMMARY

CHANNEL REACH NO.	STATION DESIGNATIONS		SOIL TYPE C = COHESIVE NC = NONCOHESIVE	Q DESIGN CAPACITY (CFS)	D75 (INCHES)	V (FT/SEC.)	a (FT²)	SELECTED CHANNEL							
	START	END						d (FT)	b (FT)	p	r	S	A	V	V/o
	LOWER LLAGAS CREEK														
1	0+00	30+00	C	10,000	—										
	30+00	47+50	C	14,000	—										
	47+50	64+00	C	18,900	—										
2	64+00	93+00	C	13,900	—	6.0	2,317	14.2	140	205	11.8	0.0007	2390	5.8	5.87
	93+00	121+00	C	17,100	—	6.0	2,850	15.2	155	223	12.6	0.0007	2820	6.1	—
	121+00	127+40	C	17,100	—	6.0	2,850	15.2	155	223	12.6	0.0007	2820	6.1	—
	127+40	150+00	C	16,300	—	6.0	2,717	15.0	150	217	12.4	0.0007	2700	6.0	—
	150+00	160+00	C	16,300	—	6.0	2,717	15.0	150	217	12.4	0.0007	2700	6.0	—
	160+00	182+00	N.C.	16,300	0.75	6.0	2,717	15.0	150	217	12.4	0.0007	2700	6.0	—
3	182+00	190+80	N.C.	16,300	0.75	4.65	3,505	15.5	190	259	13.2	0.0004	3430	4.7	4.5
	190+80	294+00	N.C.	10,100	1.00	5.4	2,020	14.2	120	183	11.5	0.0005	2110	4.9	4.6
	294+00	379+00	C.	9,300	—	6.0	1,550	11.5	120	171	9.5	0.0009	1630	5.7	—
4	379+00	386+00	C	9,300	—	6.0	1,550	11.1	120	170	9.3	0.0010	1580	5.9	—
	386+00	420+00	N.C.	8,900	1.25	5.4	1,648	11.5	120	171	9.6	0.0008	1650	5.4 ~~4.5~~	5.2
	420+00	441+00	N.C.	8,900	0.50	3.8	2,342	14.0	140	203	11.6	0.0005	2350	3.8	3.6
	441+00	458+00	N.C.	8,900	2.60	7.4	1,202.7	9.2	110	152	7.8	0.0020	1180	7.5	7.1
	UPPER LLAGAS CREEK														
	458+00	498+15	NC	8,900	2.60	7.4	1,202.7	9.2	110	152	7.8	0.0020	1180	7.5	7.1
5	498+15	513+00	N.C.	5,400	1.50	5.6	964	8.9	90	130	7.4	0.0012	960	5.6	4.65
	513+00	522+00	N.C.	5,400	2.00	6.4	844	7.9	90	125	6.7	0.0018	5345	6.4	5.2
6a	SEE SHEET 4														
6b	SEE SHEET 4														
	WEST LITTLE LLAGAS CREEK														
7a	11+00	46+50	N.C.	2,160	0.40	3.9	554	6.2	75	103	5.3	0.0010	540	4.0	3.9
	46+50	75+50	C	2,160	—	6	360	5.6	60	85	4.9	0.0020	399	5.5	—
	75+50	96+40	C.	1,680	—	6	280	5.4	50	74	4.4	0.0020	328	5.4	—

PLATE 18

LLAGAS CREEK - MODIFIED WORK PLAN

HYDRAULIC DESIGN SUMMARY

CHANNEL REACH NO.	STATION DESIGNATIONS START	STATION DESIGNATIONS END	SOIL TYPE C = COHESIVE NC = NONCOHESIVE	Q DESIGN CAPACITY (C.F.S.)	D_{75} (INCHES)	V (FT/SEC)	a (FT²)	SELECTED CHANNEL d (FT)	b (FT)	p	r	S	A	V	V_o
	WEST LITTLE LLAGAS CREEK														
7b	96+40	130+20	C	1,470	—	6	245	4.93 5.0	50	72	4.2	0.0020	300	4.9	4.3
	130+20	144+00	C	1,300	—	6	216	4.2	50	69	3.6	0.0030	245	5.4	5.3
8A	144+00	173+94	C	1,300	CONCRETE	—	—	5.2	CONCRETE BOX 18	28	3.3	0.0030	94	14.0	
	173+94	195+15	C	810	CONCRETE	—	—	4.8 5.0	CONCRETE BOX 16	26	3.1	0.0020	80	10.8	
8b	195+15	204+00	C	510	CONCRETE			3.4	CONCRETE BOX 12	19	2.2	0.0045	41	12.8	
	204+00	227+35	C	510		6	85	3.9	16	33	2.8	0.0045	93	5.7	5.7
	WEST BRANCH LLAGAS CREEK														
9	0+00	55+00	C	5,200		6	867	9.45	90	130	7.9	0.0009	1,023	5.1	5.0
	55+00	169+00	C	4,200		6	700	8.0	80	116	6.6	0.0013	768	5.4	5.3
10	169+00	182+00	C	4,200		6	700	8.0	80	116	6.6	0.0013	768	5.4	5.3
	LIONS CREEK														
10	182+00	195+00	C	2000		6	333	6.89	50	80	5.4	0.0012	432	4.6	4.5
	WEST BRANCH LLAGAS CREEK														
11a	182+00	220+00	C	2900		6	483	7.0	70	101	5.8	0.0013	588	5.0	4.9
11b	220+00	226+00	C	2,900		6	483	6.5	60	89	5.3	0.0023	474	6.1	[illegible]
	226+00	297+00	C	2,700		6	450	6.32	60	88	5.2	0.0023	448	6.0	[illegible]
	LIONS CREEK														
12	195+00	211+00	C	2,000		6	333	6.89	50	80	5.4	0.0012	432	4.6	4.5
	211+00	235+00	C	900		6	0	5.56	20	45	3.8	0.0025	171	5.2	[illegible]
	235+00	245+00	C	900		6	150	4.8 5.1	20	42	3.4	0.0035	142	5.79	[illegible]
	245+00	285+00	C	800		6	133	5.2	20	43	3.7	0.0025	155	5.0	[illegible]
	MOREY CHANNEL														
13	211+00	230+00	C	450		6	75	4.2	20	39	3.1	0.0018	119	3.8	[illegible]
	230+00	245+00	C	220		6	33	2.3	15	25	1.9	0.0060	47	5.0 4.3	[illegible]
	NORTH MOREY CHANNEL														

LLAGAS CREEK - MODIFIED WORK PLAN

HYDRAULIC DESIGN SUMMARY

CHANNEL REACH NO.	STATION DESIGNATIONS		SOIL TYPE	Q	D75	V	a	SELECTED CHANNEL							
	START	END	C = COHESIVE N.C. = NONCOHESIVE	DESIGN CAPACITY (C.F.S.)	(INCHES)	(FT/SEC)	(FT²)	d (FT)	b (FT)	p	r	S	A	V	V_o
13	217+00	233+00	C	280		6	78	3.0	15	28.4	2.2	0.0060	53	5.6	5.3
	EAST LITTLE LLAGAS CREEK														
14	0+00	6+00	C	4,160		6	693	7.3	80	113	6.7	0.0018	691	6.0	5.9
	6+00	32+00	C	3,630		6	605	6.2	85	113	5.4	0.0022	603	6.1	5.9
	32+00	52+00	C	3,630		6	605	6.2	85	113	5.4	0.0022	603	6.1	5.9
	52+00	121+50	C	2,940		6	490	5.9	70	96	5.0	0.0024	483	6.1	[illegible]
	121+50	180+50	C	1,960		6	327	5.2	55	78	4.3	0.0026	340	5.8	[illegible]
	CORRALLITOS CREEK														
	0+00	6+45	C	1,440		6	240	3.9	55	72	3.3	0.0040	249	6.0	5.5
15a	6+45	10+00	C	1,440		6	240	3.9	55	72	3.3	0.0040	249	6.0	
	10+00	45+20	C	1,440		6	240	3.9	55	72	3.3	0.0040	249	6.0	
15b	45+20	77+50	C	1,440		6	240	3.9	55	72	3.3	0.0040	249	6.0	
	TENNANT CREEK														
	77+50	126+70	C	640		6	107	3.7	25	42	2.9	0.0040	120	5.4	
	EAST LITTLE LLAGAS CREEK														
16	180+50	220+85	C	660		6	110	4.2	30	49	3.3	0.0020	161	4.2	4.2

18

LLAGAS CREEK - MODIFIED WORK PLAN

HYDRAULIC DESIGN SUMMARY

REACH NO.	STATION DESIGNATIONS		SOIL TYPE	Q DESIGN CAPACITY (CFS)	D_{75} (IN.)	V FT/SEC	a FT²	SELECTED CHANNEL											
								EXCAVATION					LEVEE						
													EXIST. CHANNEL		FLOODWAY				
	START	END						d (FT)	b (FT)	p	r	S	Qc	S	df	n	Qf	$\frac{Qn}{d_f^{8/3} \cdot S^{1/2}}$	f	H
	UPPER LLAGAS CREEK																		
a	522+00	552+00	N.C.	5,400	2.00	6.4	844	—	—	—	—	—	3,100	0.0024	3	0.05	2,300	125.3	250	5
	552+00	580+00	N.C.	5,400	2.00	6.4	844	—	—	—	—	—	2,300	0.0024	3	0.05	3,100	168.9	340	5
	580+00	582+00	N.C.	5,100	2.00	EXISTING CHANNEL ADEQUATE							7,100	0.0036	EXIST. CHANNEL ADEQUATE					
	582+00	605+00	N.C.	5,100	2.00								7,100	0.0036						
	605+00	625+50	N.C.	5,100	2.00								6,500	0.0031						
	625+50	650+00	N.C.	5,100	2.00	6.4	797	—	—	—	—	—	5,000	0.0031	NOMINAL LEVEE AT EDGE OF EXISTING CREEK					
	650+00	658+50	N.C.	5,100	2.00	6.4	797	—	—	—	—	—	4,000	0.0032	2	0.05	1,100	153.08	200	4
	658+50	675+00	N.C.	5,100	2.00	6.4*	797	7.9 ~~9~~	90	130	6.3 ~~6.4~~	0.0018	3,000	0.0032	—	—	—	—	—	—
	675+00	687+00	N.C.	5,100	2.00	6.4*	797	7.7 ~~9~~	90	130	6.3 ~~6.4~~	0.0018	2,500	0.0033	—	—	—	—	—	—
	687+00	691+00	N.C.	5,100	2.00	6.4	797	—	—	—	—	—	3,100	0.0035	3	0.05	2,000	90.25	180	5
	691+00	703+70	N.C.	5,100	2.00	6.4	797	—	—	—	—	—	3,100	0.0035	3	0.05	2,000	90.25	180	5
b	703+70	724+50	N.C.	3,430	2.00	6.4	536	—	—	—	—	—	5,000	0.0034	3	0.05	1,570	71.88	145	5
	724+50	735+00	N.C.	3,430	2.00	6.4	536	—	—	—	—	—	5,000	0.0034	3	0.05	1,570	71.88	145	5

* V_{10} FOR 10% CHANCE FLOOD = ~~5.1~~ 6.2

NOTE:

FLOODWAY CAPACITY IS ADDED TO THE EXISTING CHANNEL CAPACITY.

PLATE 20

SECTION IV

APPENDIX A

COMPUTATION SHEET
SCS-ENG-523 Rev. 8-69

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
GPO: 1972—483-109

STATE Calif.		PROJECT Upper Llagas - Chesbro Dam	
BY JRT	DATE 9.73	CHECKED BY	DATE	JOB NO.
SUBJECT Cost Estimate. (Rough Preliminary)			SHEET 1 OF 1

With Box inlet Spillway - 72 hr General Storm

Item Description	Unit	Quantity	Unit Price	Extension
Diversion of streamflow & Dewater	Job.	1	20,000	20,000
Clearing & Grubbing	Job	1	2,000	2,000
Abutment excavation (for spillway)	C.Y.	12,000	1.00	12,000
Embankment Excavation (for conduit)	C.Y.	110,000	0.50	55,000.
Earthfill - Embankment	C.Y.	377,000	0.75	283,000
Drainfill - Embankment	C.Y.	6,000	10.00	60,000
Rock Riprap - Emb. facing	C.Y.	16,000	10.00	160,000
Structure Backfill	C.Y.	2,500	2.00	5,000
Reinforced Concrete Emergency Spillway - Including Reinf. Steel	C.Y.	4,500	150.00	675,000
Reinf. Concrete Cradle & Collars	C.Y.	160	150.00	24,000
Reinforcing Steel	lbs.	600,000	0.25	150,000
R/C Pressure Pipe - 42" dia.	Lin Ft.	700	110.00	77,000
Cement Grout - between existing & new conduit - (materials & placing)	gal	10,500	1.00	10,500.
Dismantle existing valves and install at new location	Ea	3	2,000	6,000
Drain Pipe -	Lin Ft.	400	4.00	1,600
Misc. - Metalwork, Piezometers Monuments & etc.	Job.	1	10,000	10,000
Sub total				1,551,100
≈10% Contingency.				148 900
Total.				1,700,000

OCT. 1974 ESTIMATE BY VALLEY WATER DIST.

RECEIVED
MAY 5 1976
DMJM Redwood City

REAL ESTATE COST ESTIMATE
RAISE CHESBRO AND ROAD RELOCATION

em			Cost
	27	Buildings (and groups of buildings)	$696,000
	20	Residences - relocation allowance	300,000
	6	Tenant residences - relocation allowance	30,000
	4	Farm - additional relocation allowance	40,000
	1	Commercial establishment - relocation allowance	10,000
	316 220	Acres of land (varying $3,000 - $7,500 per acre)	1,344,000 [1] ~~1,222,000~~
		TOTAL	2,420,000 [1] ~~$2,298,000~~

is [illegible]st estimate is based on mid-1974 land and improvement costs.

Road reloc. includes parts of Oak Glen Ave., Uvas Rd., and Willow Springs Rd.

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[1] Revised per memo from J. Richardson, 4-23-76.

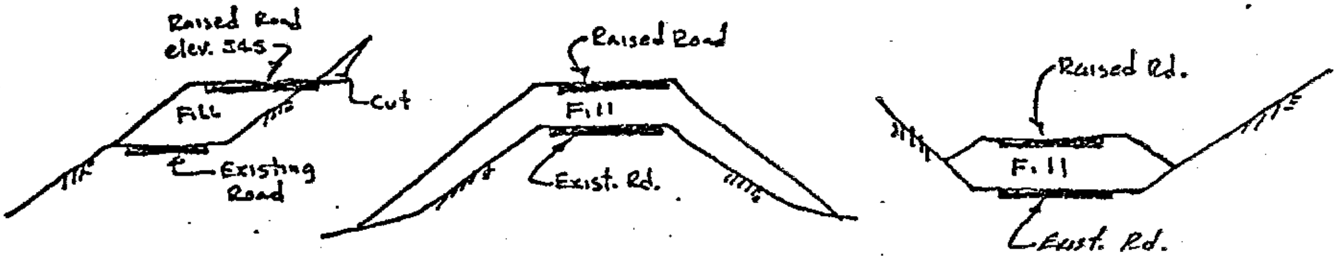
wl

This page is part of the DMJM docket, but is SUPERSEDED. See Sect. XVI

wl. 3-21-77

JMcG. 11/27/73

Oak Glen Avenue Raising at Chesbro Reservoir



TYPICAL SECTIONS

ITEMS OF CONSTRUCTION

1. FILL (from SCS calculations to elevation 545)	
240,000 cy @ $1.50/cy	— $360,000
FILL (use 10% for Willow Springs road raising)	
24,000 cy @ $1.50/cy	— 36,000
2. Soil Testing lump sum	— 10,000
3. Pavement Placement (Use 32' all paved Rd.)	
3.5 miles x 5280'/mile x 32' wide x $0.75/sq ft.	— 444,000
4. Culvert Extensions lump Sum	— 25,000
Sub Total 1	— 875,000
5. Pavement Removal 10%	— 88,000
6. Detours 10%	— 88,000
Sub Total 2	1,051,000
20% Contingencies	— 210,000
TOTAL	$1,261,000

Unit Cost

$1,261,000 / 3.5 miles = $360,000 / mile

SECTION V

HYDROLOGY

SECTION V Contents

Item	Page
Letter to W. Styner	89
Hydrology Summary Tables	90
Drainage Area vs Discharge Curves	95

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

2828 Chiles Road, Davis, CA 95616 Phone: (16) 758-2200

SUBJECT: WS - Llagas Creek Watershed
Hydrology - Revision of Peak Flows

DATE:May 2, 1979

TO: Wendell Styner
WTSC, Portland, Oregon

Since the original work plan was developed, several changes in drainage areas have taken place. A freeway has been constructed through the middle of the watershed plus several channels have been constructed.

A complete review of the hydrology for the Llagas Creek project was made including checking of regional data, Corps of Engineers data, SCVWD Hydrologic data and SCS TR-20 analysis.

After this review was made, it was determined that the best approach was to adjust the peak discharges based on drainage area-peak flow curves which used the work plan hydrology.

This method provided values which were acceptable to the District. A complete tabulation of the new values is included. (See table 1.) This table also shows the "old" Q's and changes in drainage areas at each index point.

Back up documentation is kept on file in the California State Office.

Edward J Schmit
EDWARD J. SCHMIT
State Hydrologist

Enclosures

LLAGAS CREEK - UPPER

CALIFORNIA
EJS 11-9-78
HYDROLOGY SUMMARY
LLAGAS CR

CHANNEL NAME & STATION	WORKPLAN DA Sq Mi	REV DA Sq Mi	WORKPLAN Q CFS	NEW Q (Point) CFS	100-yr DESIGN DISCHARGE CFS	COMMENTS
LLAGAS						
444+00		58.54		8850		
458+00	58.9		8900		8900	
498+15	33.9	36.41	4920	5400	5400	Above confluence of Tennant CK.
550+00	"	35.71	"	5280	"	
582+00	"		"		5100	
625+50	"	34.7	"	5080	"	
685+00	"	34.3	"	4920	"	
687+00	"		"		"	
703+70	27.3	26.94	3430	3300	3430	no Adj made - Above W.L.L.C.
CONT						
WEST LITTLE LLAGAS						
0+00	4.9	7.18	1720	2500	2160'	{Additional Drainage Area goes into LLAGAS CR. DIRECTLY}
30+70		6.16	"	2160	"	
46+50			"		"	
59+80		6.03	"	2100	"	
75+50	3.2	5.09	1130	1790	1680	{Above confluence of Edmundson}
96+40		4.78	"	1680	"	
130+20		4.19	870	1470	1470	
144+00	2.8	3.64	800	1300	1300	
195+00	1.8	2.26	640	810	810	
217+35	1.4	1.25	510	450	510	Assumed workplan DA

5

LLAGAS CREEK - UPPER, CONT.

CALIFORNIA
EJS 11-9-78
HYDROLOGY SUMMARY
LLAGAS CR
2 5

HANNEL NAME & STATION	WORKPLAN DA SQ MI	REV. DA SQ MI	WORKPLAN Q CFS	NEW Q (Point) CFS	100-yr DESIGN DISCHARGE CFS	COMMENTS
EAST LITTLE LLAGAS						
0+00	21.6	21.01	4160	4160	4160	
6+00	17.7	18.28	3630	3720	3630	
52+00	13.0		2940		"	
78+00		13.6	"	2980	"	
21+50	4.5	7.89	830	1960	1960	{DA changed because of freeway
30+50	"	2.67	"	660	660	Below confluence with Corrallitos Cr}
20+85		.53	"	130	"	
ORRALLITOS						
0+00	8.5	5.71	2100	1410	1400	
45+20		4.99	"	1250	"	
77+50			"		"	
ENNANT						
77+50	5.2	2.6	1300		640	
84+50	[illegible]	2.6	"	640	"	
126+70		1.85		460	[illegible]	

LLAGAS CREEK-LOWER

HANNEL NAME & STATION	WORKPLAN D.A. Sq Mi	REV. D. A. Sq Mi	WORK PLAN Q CFS	NEW Q (POINT) CFS	100-Yr DESIGN DISCHARGE CFS	COMMENTS
LAGAS						
)+00	99.5	103.72	10000[1]			
0+00	"	"	14300[2]			
7+50	84.4	103.72	13900[3]	19600	13900[2]	
4+00	"	89.65		17100	13900[3]	
3+40	"	"	16100		17100	
27+40	"	85.79	"	16300	16300	{Above confluence with Princevale Drain}
82+00	"	"	"		"	
90+80	61.7	67.68	9300	10100	10100	{Above Confulence with West Branch Llagas Cr}
94+00		67.68	"	10100	9300	
79+00	[illegible]	61.09		9200	"	
86+00	58.9	[illegible]	8900	[illegible]	8900	
20+00			"		"	
41+00		58.54	"	8850	"	
58+00			"		"	
98+00		57.42	"	8700		

CALIFORNIA

EJS 11-9-78

HYDROLOGY SUMMARY

LLAGAS CR

3

5

CALIFORNIA
EJS 11-9-78
HYDROLOGY SUMMARY
LLAGAS CR

LLAGAS CREEK-LOWER

CHANNEL NAME & STATION	WORKPLAN D.A. Sq Mi	REV. D. A. Sq Mi	WORK PLAN Q CFS	NEW Q (POINT) CFS	100-Yr DESIGN DISCHARGE CFS	COMMENTS
LLAGAS						
0+00	99.5	103.72	10000[1]			
30+00	"	"	14300[2]			
47+50	84.4	103.72	13900[3]	19600	13900[2]	
64+00	"	89.65 *		17100*	13900[3]	
93+40	"	89.65 *	16100	17100 *	17100	
127+40	"	85.79 ~~89.65~~ *	"	16300 * ~~17100~~	16300	
182+00	"	85.79	"	16300	"	
190+80	61.7	67.68	9300	10100	10100	{Above Confluence with West Branch Llagas Cr}
294+00		67.68	"	10100	9300	
379+00	[illegible]	61.09		9200	"	
386+00	58.9	[illegible]	8900	[illegible]	8900	
420+00			"		"	
441+00		58.54	"	8850	"	
458+00			"		"	
478+00		57.42	"	8700		

* changed by Schmit 4-9-79

3
5
92

LLAGAS CREEK - LOWER, CONT.

CHANNEL NAME & STATION	WORKPLAN D.A. sq mi	REV. D.A. sq mi	WORKPLAN Q CFS	NEW Q (POINT) CFS	100-yr DESIGN DISCHARGE CFS	COMMENTS
WEST BRANCH LLAGAS						
0+00	18.3	18.11	5200	5150	5200	
+		14.19				
55+00	13.3	12.2	4200	4100	4200	{above miller slough}
169+00		10.77		3820		
182+00	6.6	5.98	2900	2580	2900	
220+00						
226+00	6.1		2700			
270+00		5.83		2530	2700	
297+00						
LIONS CR.						
182+00	4.6	4.25	2000	1830	2000	
206+00		4.12		1780		
211+00	2.4	2.17	1,150	910	900	
245+00	1.9	2.05	800	860	800	
281+00						

LLAGAS CREEK - LOWER, CONT.

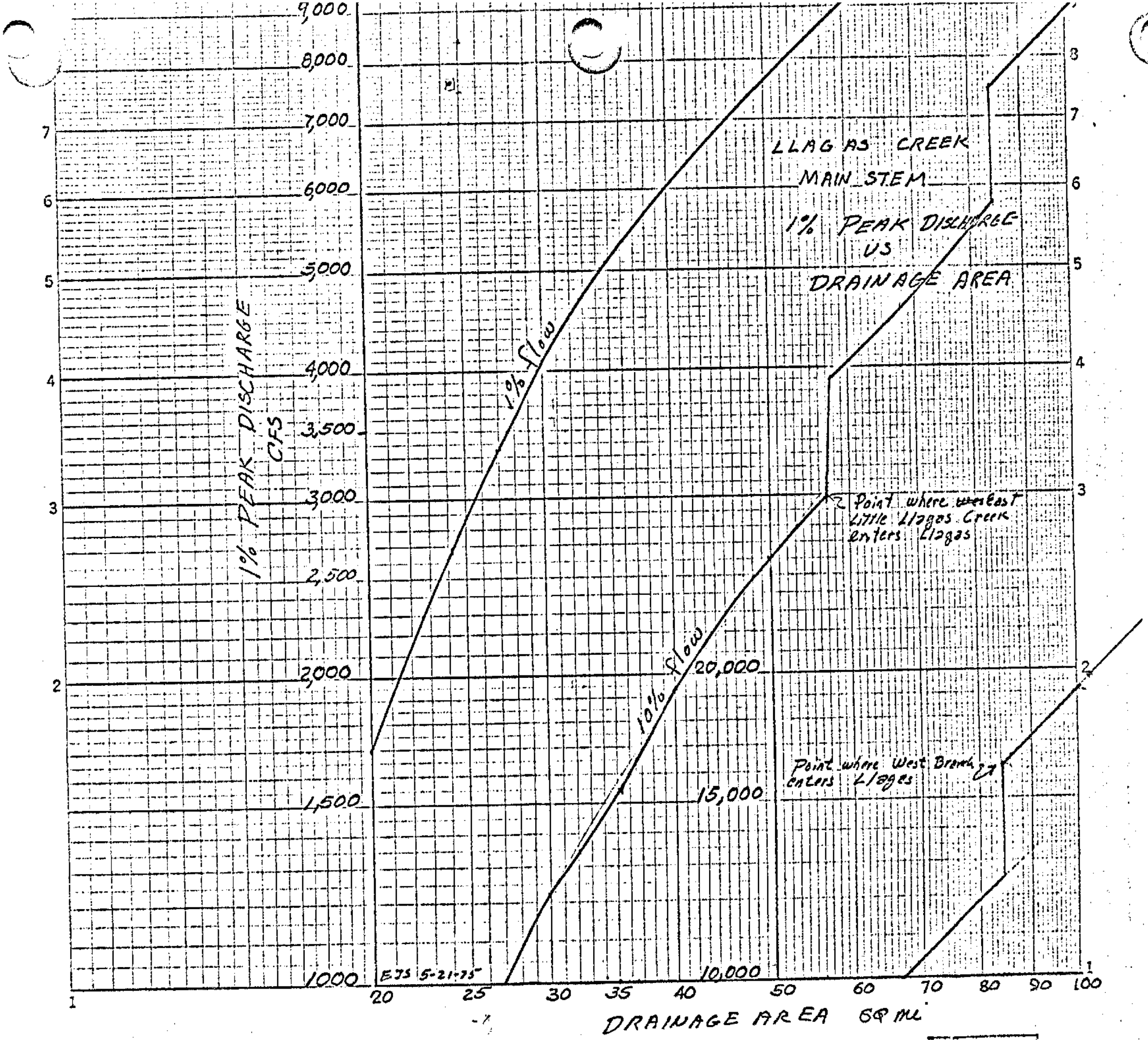
CHANNEL NAME + STATION	WORK PLAN D.A. SQ MI	REV. D.A. SQ MI	WORKPLAN Q CFS	NEW Q (POINT) CFS	100-YR DESIGN DISCHARGE CFS	COMMENTS
MOREY						
211+00	.6.	1.19	200	450	450	
227+00					450	
230+00		.52		210	200	
NORTH MOREY						
217+00	1.9	.69	900	280	280	
233+00						

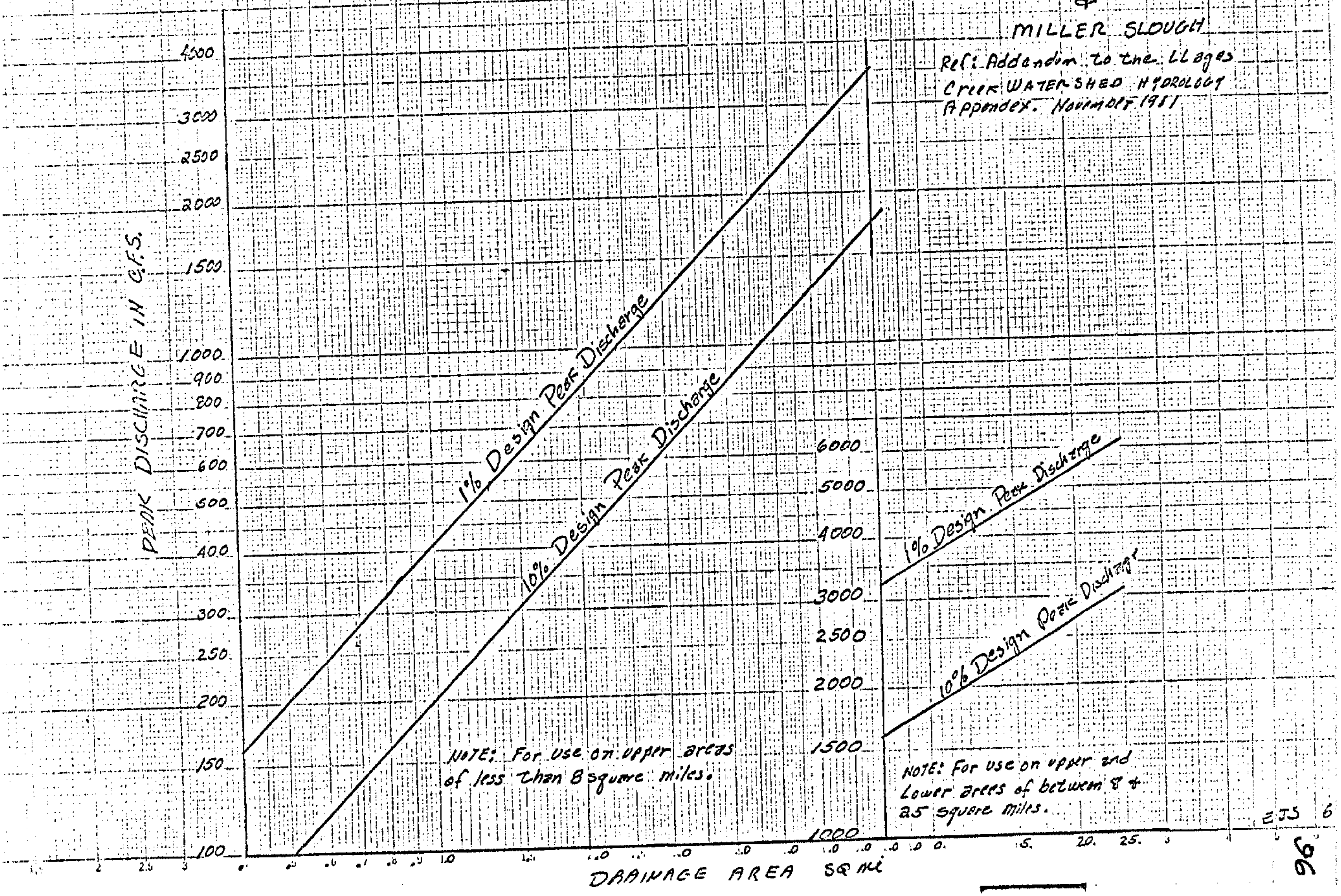
CALIFORNIA
EJS 11-9-78
SUMMARY

LLAGAS

5

5


LLAGAS CREEK
MAIN STEM
1% PEAK DISCHARGE
VS
DRAINAGE AREA
1% PEAK DISCHARGE CFS
9,000
8,000
7,000
6000
5000
4,000
3,500
3000
2,500
2000
1,500
1000
20,000
15,000
10,000
1% flow
10% flow
Point where ~~west~~ East Little Llagas Creek enters Llagas
Point where West Branch enters Llages
EJS 5-21-75
20
25
30
35
40
50
60
70
80
90
100
DRAINAGE AREA SQ MI

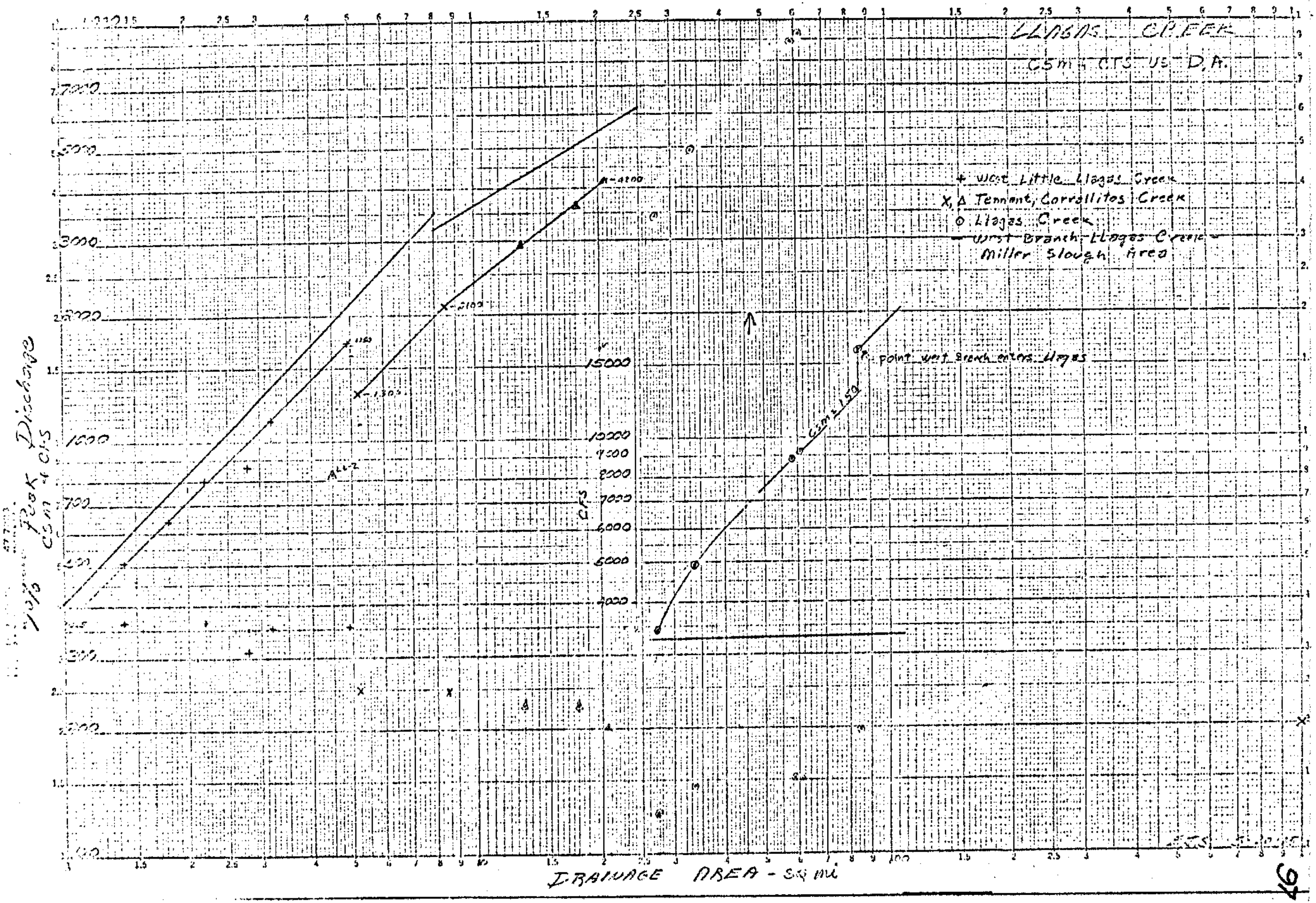


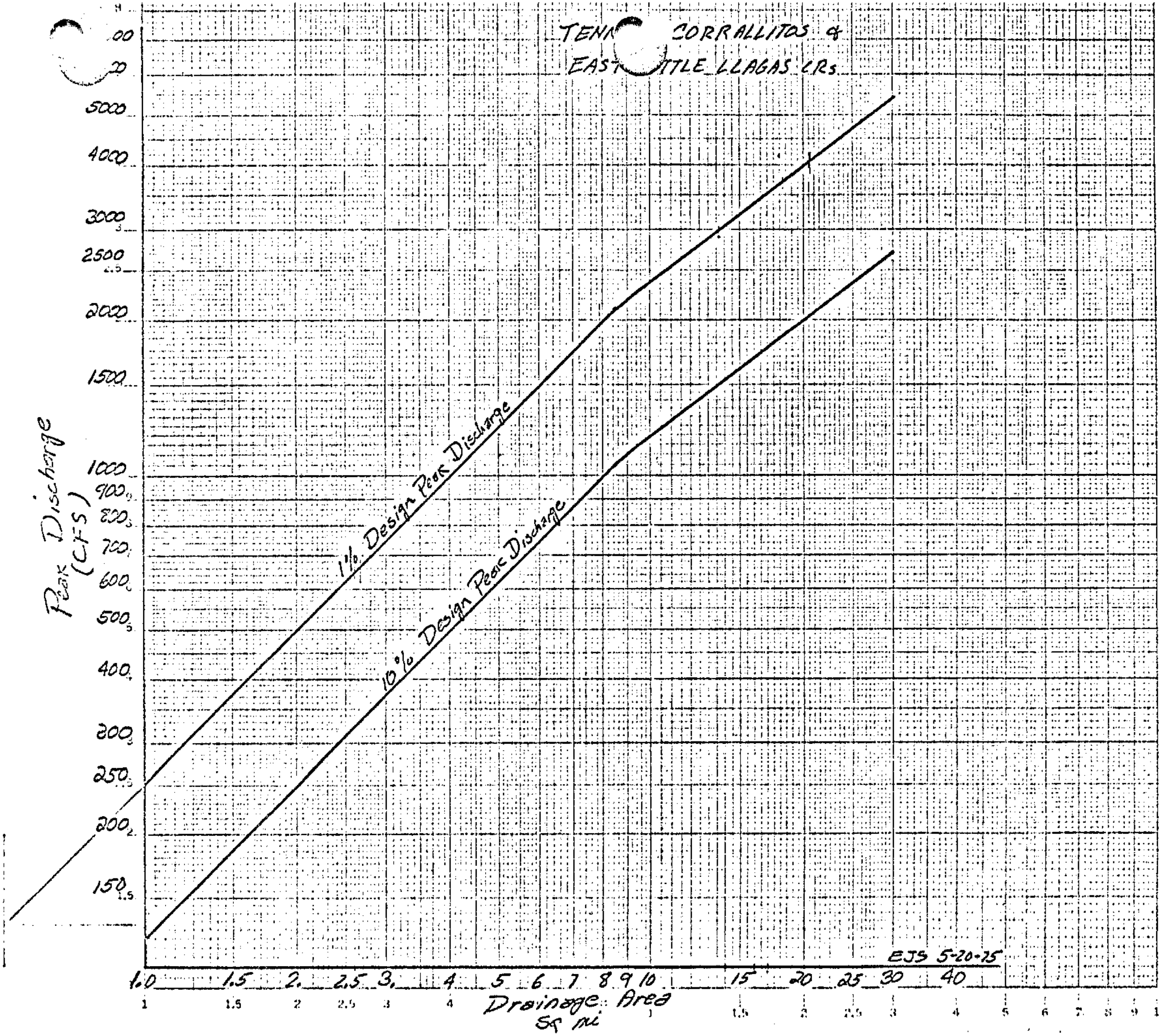
WEST BRANCH LLAGAS CREEK
&
MILLER SLOUGH

Ref: Addendum to the Llagas Creek WATERSHED HYDROLOGY Appendex. November 1951

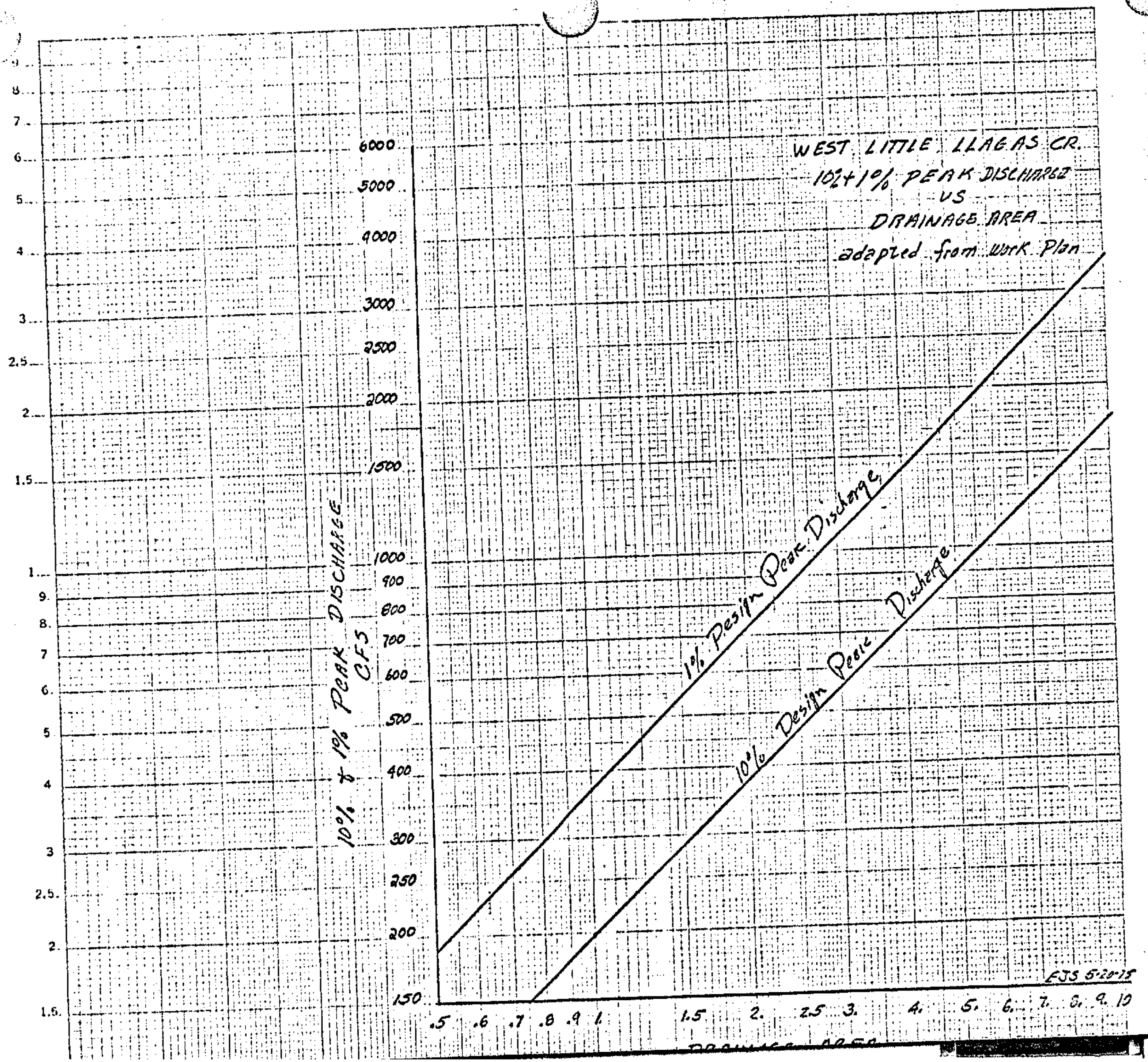
NOTE: For use on upper areas of less than 8 square miles.

NOTE: For use on upper and Lower areas of between 8 & 25 square miles.


LLAGAS CREEK
CSM + CFS VS D.A.
+ West Little Llagas Creek
X, Δ Tennant, Corrallitos Creek
⊙ Llagas Creek
— West Branch Llagas Creek – Miller Slough Area
10% Peak Discharge
CSM + CFS
7000
5000
3000
2000
1000
700
500
300
200
100
CFS
15000
10000
9000
8000
7000
6000
5000
4000
1150
1300
2100
4200
CSM = 150
point west branch enters Llagas
DRAINAGE AREA - SQ MI



TENN CORRALLITOS &
EAST ITTLE LLAGAS CRs
Peak Discharge (CFS)
5000
4000
3000
2500
2000
1500
1000
900
800
700
600
500
400
300
250
200
150
1% Design Peak Discharge
10% Design Peak Discharge
1.0
1.5
2.
2.5
3.
4
5
6
7
8
9
10
15
20
25
30
40
Drainage Area
Sq mi
EJS 5-20-75


WEST LITTLE LLAGAS CR.
10%+1% PEAK DISCHARGE
VS
DRAINAGE AREA
adapted from Work Plan
1% Design Peak Discharge
10% Design Peak Discharge
10% & 1% Peak Discharge CFS
6000
5000
4000
3000
2500
2000
1500
1000
900
800
700
600
500
400
300
250
200
150
.5
.6
.7
.8
.9
1.
1.5
2.
2.5
3.
4.
5.
6.
7.
8.
9.
10
DRAINAGE AREA
EJS 5-20-75
9
8
7
6
5
4
3
2.5
2
1.5
1
9
8
7
6
5
4
3
2.5
2
1.5

SECTION VI

O & M and LAND TREATMENT COSTS

SECTION VI Contents

Item	Page
Llagas Creek O+M Costs	102
Llagas Creek Supplements	
Land Treatment Cost Update	104
Fire Control Cost Update	105
Types of Channel before project	106

WR
10-15-78
102

LLAGAS CREEK

O&M COSTS

PER DISCUSSIONS W/ RANDY TALLEY OF THE SANTA CLARA VALLEY WATER DISTRICT IN JUNE 1978, WE WILL USE $4000 PER MILE ANNUALLY FOR CHANNELS,

CHESBRO RESERVOIR - THE DMJM REPORT SHOWS AN ANNUAL COST OF $60,000, FURNISHED BY THE SOUTH SANTA CLARA VALLEY WATER CONS. DISTRICT. THIS IS APPARENTLY THE COST OF OPERATING & MAINTAINING THE EXISTING RESERVOIR. FOR A WATERSHED PROJECT O&M COST USE 0.005 × THE CONSTRUCTION COST FOR RAISING THE DAM, PER WS MEMO CAL-6.

LOWER LLAGAS - CHANNELS - 17.2 MI @ $4000 = $70,000

UPPER LLAGAS - CHESBRO DAM - $2,010,000[3] × 0.005 = $10,000

CHANNELS - (12.3 + 2.8[1] + 0.8[2]) = 15.9 MI. @ 4000 = 65,000

$75,000

[1] LEVEED FLOOD PLAIN

[2] EXISTING CHAN. ADEQUATE BUT MUST BE MAINTAINED

Cal. F
L L Hansen 4-16-79
O&M

The previous page demonstrates O&M costs without ~~l~~andscaping

As per conversation with J. Richardson (SCVWD)

the following data is used to calculate O&M for the landscaping

769 trees per mile of channel
$15 per year to establish
20% of establishment cost

Note:
Land scaping will be done only on Llagas Creek

10000 trees will be planted on Upper & Lower Llagas Creek Together.
The total length of improvement on Llagas Creek extends 13.0 miles

Therefore $\frac{10000}{13}$ = 769 trees per mile.

Length of Creek in this supplement = 4.34 miles

O&M Cost = 4.34 (769)(15)(0.2) = 10,012 ≃ $10,000

∴ Total O&M on Upper Llagas Creek = 75,000 + 10,000 = $85,000

Lower Llagas Creek

Length of Creek in this Supplement = 8.67 miles

O&M Cost = 8.67 miles (769)(15)(0.2) = $20,001 ≃ $20,000

∴ Total O&M on Lower Llagas Creek = $70,000 + 20,000 = $90,000

WR
11-3-78
104

LLAGAS CREEK SUPPLEMENTS
LAND TREATMENT COST UPDATE

REF. - DISCUSSIONS W/ G. LYNN BULLARD, (EVT. SPEC. & STATE RES. CONS. REPRESENTATIVE):
FOR THIS SUPPL. WE WILL ASSUME ACREAGE TO BE TREATED REMAINS THE SAME AND WE WILL UPDATE COSTS USING INFLATION FACTORS.

REF. - HINK'S CALIF. COST INDEX CHART:
JULY 1967 TO JULY 1977 ⇒ FACTOR = 2.06
USE 2.1

	LOWER LLAGAS			UPPER LLAGAS		
	ORIG.	x 2.1	USE	ORIG.	x 2.1	USE
CROP	85,900	180,400	180,000	131,900	277,000	280,000
PASTURE & HAY	12,300	25,800	25,000	10,300	22,000	22,000
RANGE	5,900	12,400	15,000	8,500	18,000	18,000
MISC.	1,700	3,600	5,000	27,200	57,000	60,000
TECH. ASST - PL566	6,000	12,600	15,000	17,500	37,000	40,000
OTHER	9,100	19,100	20,000	26,200	55,000	60,000
Σ	120,900		260,000	221,600		480,000

wd
11-5-78

LLAGAS CREEK SUPPLEMENTS
FIRE CONTROL COST UPDATE

REF - COST ESTIMATE PREPARED BY CDF[1] 12-1-71

PL-566 - $115,410
OTHER - 115,410
230,820 FOR INSTALLING THE MEASURES.

THIS ESTIMATE WAS CONSIDERED STILL GOOD IN SEPT. 1974, AND MOST OF THE WORK WAS DONE BY THEN.

USE PL-566 - 120,000
OTHER - 120,000

LAND RIGHTS - WORK PLAN SHOWED $63,600. MORE RECENT FIGURES NOT READILY AVAILABLE. USE $70,000

TECH. ASSISTANCE:

REF. LETTER FROM CDF (MORAN) TO USFS (LEISZ), 8-5-74:

TECH. ASSISTANCE NOT READILY SEPARABLE. MOST DESIGN DONE DURING PLANNING PHASE.

ROUND WORK PLAN FIGURES UP TO

PL-566 - $20,000
OTHER - 20,000

[1] CALIF DIVISION OF FORESTRY

Page 106 Deleted

SECTION VII

APPENDIX B

WS
9-78

LLAGAS CREEK - MODIFIED WORK PLAN

(M) ESTIMATE OF CHANNEL COSTS

PART OF LLAGAS CR.
REACH NO. 2 Station 64 + 00 to Station 127 + 40

Item	Quantity	Unit Cost	$
Channel Excavation	445,648	4.00 ~~1.65~~	1,902,769 ~~735,300~~
Compacted Embankment	30,044	0.50	15,000
Drop Structures	1350.7	400.00 ~~200.00~~	546,000 ~~270,100~~
Drainage Inlets	6 EA.	8,000. ~~3,000.00~~	48,000 18,000
Riprap	0	—	0
Filter Stone	0	—	0
Seeding	13.24	2,000 ~~650.00~~	26,500 ~~8,600~~
Landscaping		5% L.S.	95,000 ~~11,400~~
Structural Excavation			—
Rectangular Concrete Channel			
Compacted Backfill			
Levee Embankment			—
Site Preparation (Levees)			
			2,615,400 ~~1,058,400~~

[illegible]
July 1980 [illegible]

Subtotal

15% Contingency

TOTAL $ 3,007,710 ~~1,217,200~~

USE $ ~~1,220,000~~
3,008,000

ENGR. (18.75%) $ 230,000

[illegible] [illegible] SUM.(6.25%) - $ 80,000

1-2
9-78
109

LLAGAS CREEK - MODIFIED WORK PLAN

ESTIMATE OF CHANNEL COSTS

REACH NO. (N) PART OF 2 LLAGAS CR. Station 127+40 to Station 182+00

Item	Quantity	Unit Cost	$
Channel Excavation	612,173	4.00 ~~1.65~~	2,448,692 1,010,100
Compacted Embankment	8970	~~0.50~~	~~4,500~~
Drop Structures	1350.7	400 ~~200.00~~	540,400 ~~270,100~~
Drainage Inlets	6 EA.	8,000 ~~3,000.00~~	48,000 ~~16,000~~
Riprap	20,101	42 ~~20.00~~	844,242 ~~402,000~~
Filter Stone	12,509	30 ~~15.00~~	375,270 ~~187,600~~
Seeding	4.42	2,000 ~~650.00~~	[illegible] ~~2,900~~
Landscaping		5% ~~L.S.~~	199,[illegible] ~~11,400~~
Structural Excavation			—
Rectangular Concrete Channel			—
Compacted Backfill			
Levee Embankment			—
Site Preparation (Levees)			—
			4,[illegible] ~~1,906,600~~

Subtotal

15% Contingency

TOTAL $ 4,[illegible]
~~2,192,600~~

USE $ 2,190,000
4,[illegible]

E [illegible] (18.75%) — $4[illegible]

[illegible] (6.25%) — $[illegible]

LLAGAS CREEK - MODIFIED WORK PLAN

ESTIMATE OF CHANNEL COSTS

REACH NO. 3 LLAGAS CR. Station 182 + 00 to Station 379 + 00

Item	Quantity	Unit Cost	$
Channel Excavation	534,346	4.00 ~~1.65~~ C.Y.	2,290,000 ~~882,496~~
Compacted Embankment	37,814	~~0.50~~ C.Y.	~~18,907~~
Drop Structures	5,471.2	400 ~~200.00~~ C.Y.	2,188,400 ~~1094240~~
Drainage Inlets	7 EA	8,000 ~~3,000.00~~ EA.	56,000 ~~21,000~~
Riprap	35,814	42 ~~20.00~~ C.Y.	1,504,200 ~~716,220~~
Filter Stone	26,450	30 ~~15.00~~ C.Y.	793,500 ~~396,750~~
Seeding	15.48	2,000 ~~650.00~~ Ac.	31,000 ~~10,062~~
Landscaping	-	L.S.	46,800
Structural Excavation	0	3.00 C.Y.	-
Rectangular Concrete Channel	0	126.00 C.Y.	-
Compacted Backfill	0	5.00 C.Y.	-
Levee Embankment	0	1.25 C.Y.	-
Site Preparation (Levees)	0	3.00 L.F.	-

Subtotal	6,910,500 $ 3,186,535
15% Contingency	1,036,575 ~~477,980~~
TOTAL	$ ~~3,664,515~~ 7,947,000

WA
10-2-78

111

LLAGAS CREEK - MODIFIED WORK PLAN

LOWER LLAGAS
ESTIMATE OF CHANNEL COSTS
PART OF LLAGAS CR.
REACH NO. 4 Station 379+50 to Station 458+00

Item	Quantity	Unit Cost	$
Channel Excavation	498,230 C.Y.	1.65	822,100
Compacted Embankment	15,563 C.Y.	0.50	7,800
Drop Structures	2,472.3 C.Y.	200.00	494,500
Drainage Inlets	9 EA.	3,000.00	27,000
Riprap	22,866 C.Y.	20.00	457,300
Filter Stone	14,667 C.Y.	15.00	220,000
Seeding	1.5 AC.	650.00	1,000
Landscaping	L.S.	L.S.	23,100
Structural Excavation			
Rectangular Concrete Channel			
Compacted Backfill			
Levee Embankment			
Site Preparation (Levees)			

Subtotal	2,052,800
15% Contingency	
TOTAL	2,360,700

USE $2,360,000

ENGR. (18.75%) = $440,000

OTHER INSTALL SERV. (6.25%) = $150,000.

LLAGAS CREEK - MODIFIED WORK PLAN

ESTIMATE OF CHANNEL COSTS

WEST BRANCH LLAGAS

REACH NO. 9 Station 0 + 00 to Station 169 + 00

Item	Quantity	Unit Cost	$
Channel Excavation	314,277	1.65 C.Y.	518,557
Compacted Embankment	1630 CY	0.50 C.Y.	815
Drop Structures	976	200.00 C.Y.	195,200
Drainage Inlets	17 EA	3,000.00 EA	51,000
Riprap	474	20.00 C.Y.	9,480
Filter Stone	355	15.00 C.Y.	5,325
Seeding	31.35	650.00 Ac.	20378
Landscaping	-	L.S.	30,300
Structural Excavation	0	3.00 C.Y.	-
Rectangular Concrete Channel	0	126.00 C.Y.	-
Compacted Backfill	0	5.00 C.Y.	-
Levee Embankment	0	1.25 C.Y.	-
Site Preparation (Levees)	0	3.00 L.F.	-

RR Bridge

Subtotal	$ 831,055
15% Contingency	124,658
TOTAL	$ 955,713

WJ
10-3-75

LLAGAS CREEK - MODIFIED WORK PLAN

"WEST BRANCH" **ESTIMATE OF CHANNEL COSTS**

PART OF
REACH NO. 10 Station 169 + 00 to Station 182 + 00

Item	Quantity	Unit Cost	$
Channel Excavation	79,444 C.Y.	1.65	131,100
Compacted Embankment	0		—
Drop Structures	0		—
Drainage Inlets	0		—
Riprap	0		—
Filter Stone	0		—
Seeding 36.11 × 1/2	18.06 Ac.	650.00	11,700
Landscaping 8,100 × 1/2	L, S.		4,100
Structural Excavation	—		—
Rectangular Concrete Channel	—		—
Compacted Backfill	—		—
Levee Embankment	—		—
Site Preparation (Levees)	—		

Subtotal	146,900
15% Contingency	
TOTAL	$170,000

ENGR. (18.75%) - $30,000
OTHER INSTALL. SERV. (6.25%) - $10,000

U.D.
10-3-78

LLAGAS CREEK - MODIFIED WORK PLAN

"LIONS CREEK" ESTIMATE OF CHANNEL COSTS

PART OF

REACH NO. 10 Station 182+00 to Station 195+00

Item	Quantity	Unit Cost	$
Channel Excavation	57,778 C.Y.	1.65	95,300
Compacted Embankment	0		–
Drop Structures	0		–
Drainage Inlets	1 EA.	3,000.00	3,000
Riprap	0		–
Filter Stone	0		–
Seeding	18.05 AC.	650.00	11,700
Landscaping	L.S.		4,000
Structural Excavation	–		–
Rectangular Concrete Channel	–		–
Compacted Backfill	–		–
Levee Embankment	–		–
Site Preparation (Levees)	–		

Subtotal	114,000
15% Contingency	
TOTAL	$130,000

ENGR. (18.75%) - $25,000

OTHER INSTALL. SERV. (6.25%) - $10,000

LLAGAS CREEK - MODIFIED WORK PLAN

ESTIMATE OF CHANNEL COSTS

WEST BRANCH LLAGAS CR.
REACH NO. 11a Station 182+00 to Station 220+00

Item	Quantity	Unit Cost	$
Channel Excavation	101,025	1.65 C.Y.	166,691
Compacted Embankment	3111 C.Y.	0.50 C.Y.	1,556
Drop Structures	270.1	200.00 C.Y.	54,020
Drainage Inlets	4 EA	3,000.00 EA	12,000
Riprap	205	20.00 C.Y.	4,100
Filter Stone	153	15.00 C.Y.	2295
Seeding	4.62	650.00 A.C	3,003
Landscaping	-	L.S.	6,800
Structural Excavation	0	3.00 C.Y.	-
Rectangular Concrete Channel	0	126.00 C.Y.	-
Compacted Backfill	0	5.00 C.Y.	-
Levee Embankment	0	1.25 C.Y.	-
Site Preparation (Levees)	0	3.00 C.Y.	-

Subtotal	$ 250,465
15% Contingency	37,570
TOTAL	$ 288,035

LLAGAS CREEK - MODIFIED WORK PLAN

ESTIMATE OF CHANNEL COSTS

WEST BRANCH LLAGAS
REACH NO. 11b Station 220+00 to Station 297+00

Item	Quantity	Unit Cost	$
Channel Excavation	175,884	1.65 C.Y.	290,209
Compacted Embankment	4,186 c.y.	0.50 C.Y.	2,093
Drop Structures	540.2	200.00 C.Y.	108,040
Drainage Inlets	8 EA	3,000.00 EA	24,000
Riprap	192	20.00 C.Y.	3,840
Filter Stone	144	15.00 C.Y.	2,160
Seeding	9.07	650.00 Ac.	5,896
Landscaping	-	L.S.	8,400
Structural Excavation	0	3.00 C.Y.	-
Rectangular Concrete Channel	0	126.00 C.Y.	-
Compacted Backfill	0	5.00 C.Y.	-
Levee Embankment	0	1.25 C.Y.	-
Site Preparation (Levees)	0	3.00 L.F.	-

Subtotal $ 444,638

15% Contingency 66,696

TOTAL $ 511,334

W-2
10-3-78

LLAGAS CREEK - MODIFIED WORK PLAN

ESTIMATE OF CHANNEL COSTS

(0)
PART OF LIONS CR.
REACH NO. 12 Station 195 + 00 to Station 281 + 00

Item	Quantity	Unit Cost	$
Channel Excavation 160,330 - 4,700	155,630 C.Y.	1.65	256,800
Compacted Embankment	519 C.Y.	0.50	300
Drop Structures	348.6 C.Y.	200.00	69,700
Drainage Inlets	9 EA.	3,000.00	27,000
Riprap	348 C.Y.	20.00	7,000
Filter Stone	260 C.Y.	15.00	3,900
Seeding 12.97 - 0.56	12.41 AC.	650.00	8,100
Landscaping			—
Structural Excavation			—
Rectangular Concrete Channel			
Compacted Backfill			—
Levee Embankment			—
Site Preparation (Levees)			—

Subtotal	372,800
15% Contingency	
TOTAL	430,000

SEE NEXT PAGE

ENGR. (1[illegible].5%) - 73,000
OTHER INSTALL SERV - 29,000

wa
10-3-78
118

LLAGAS CREEK - MODIFIED WORK PLAN

ESTIMATE OF CHANNEL COSTS

(N) PART OF LIONS CR.

REACH NO. 12 **Station** 281+00 **to Station** 285+00

Item	Quantity	Unit Cost	$
Channel Excavation 315 × 400 × 1/27	4700 C.Y.	1.65	7,800
Compacted Embankment	0		—
Drop Structures	0		—
Drainage Inlets	0		—
Riprap	0		—
Filter Stone	0		—
Seeding 30.4 × 400' × 2	0.56 AC.	650.00	400
Landscaping			—
Structural Excavation			—
Rectangular Concrete Channel			—
Compacted Backfill			—
Levee Embankment			—
Site Preparation (Levees)			

Subtotal	8,200
15% Contingency	
TOTAL	$10,000

ENGR. (15.75%) - $2,000
OTHER INSTALL. SERV. (6.75%) - 1,000

LLR
10-3-78
119

LLAGAS CREEK - MODIFIED WORK PLAN

(0)

ESTIMATE OF CHANNEL COSTS

PART OF MOREY CHAN.

REACH NO. 135 Station 211 + 00 to Station 227 + 00

1600 L.F.

Item	Quantity	Unit Cost	$
Channel Excavation 342 × 1600 × 1/27	20,260 C.Y.	1.65	33,400
Compacted Embankment	0		—
Drop Structures	0		—
Drainage Inlets	1 EA	3,000.00	3,000
Riprap	0		—
Filter Stone	0		—
Seeding 1600' × 29' × 2	2.13 AC.	650.00	1,400
Landscaping	L.S.		800
Structural Excavation	–		
Rectangular Concrete Channel	–		
Compacted Backfill	–		
Levee Embankment	–		
Site Preparation (Levees)	–		

Subtotal	38,600
15% Contingency	
TOTAL	$50,000

ENGR. (18.75%) = $10,000
OTHER INSTALL SERV. (6.25%) = $3,000

WZ
10-3-78
120

LLAGAS CREEK - MODIFIED WORK PLAN

ESTIMATE OF CHANNEL COSTS

(M)
PART OF
REACH NO. 13 S MOREY CHAN. Station 227+00 to Station 245+00
1800 L.F.

Item	Quantity	Unit Cost	$
Channel Excavation 26,456-20,260	6196 C.Y.	1.65	10,200
Compacted Embankment	0		–
Drop Structures	0		–
Drainage Inlets	2 EA.	3,000.00	6,000
Riprap	0		–
Filter Stone	0		–
Seeding	1.76 AC.	650.00	1,100
Landscaping	L.S.		900
Structural Excavation	–		–
Rectangular Concrete Channel	–		–
Compacted Backfill	–		–
Levee Embankment	–		–
Site Preparation (Levees)	–		

Subtotal	18,200
15% Contingency	
TOTAL	$29000

ENGR. (16.75%) = 5,000

OTHER INSTALL SERV. (6.25%) = 2,000

LLAGAS CREEK - MODIFIED WORK PLAN

ESTIMATE OF CHANNEL COSTS

NORTH MOREY CHANNEL
REACH NO. 13 N Station 217+00 to Station 233+00

Item	Quantity	Unit Cost	$
Channel Excavation	10,401	1.65 C.Y.	17,162
Compacted Embankment	0	0.50 C.Y.	-
Drop Structures	0	200.00 C.Y.	-
Drainage Inlets	3 EA	3 000.00 EA.	9,000
Riprap	153	20.00 C.Y	3,060
Filter Stone	115	15.00 C.Y	1,725
Seeding	1.37	650.00 Ac.	891
Landscaping	-	L.S.	1,600
Structural Excavation	0	3.00 C.Y.	-
Rectangular Concrete Channel	0	126.00 C.Y.	-
Compacted Backfill	0	5.00 C.Y.	-
Levee Embankment	0	1.25 C.Y	-
Site Preparation (Levees)	0	3.00 L.F.	-

Subtotal	$ 33,438
15% Contingency	5,016
TOTAL	$ 38,454

[illegible]
10-3-78

LLAGAS CREEK - MODIFIED WORK PLAN

UPPER LLAGAS **ESTIMATE OF CHANNEL COSTS**
PART OF LLAGAS CR.
REACH NO. 4 **Station** 458 + 00 **to Station** 498 + 15

Item	Quantity	Unit Cost	$
Channel Excavation	188,042 C.Y.	1.65	310,300
Compacted Embankment	0	—	—
Drop Structures	0	—	—
Drainage Inlets	4 EA	3,000.00	12,000
Riprap	11,357 C.Y.	20.00	227,100
Filter Stone	6,568 C.Y.	15.00	98,500
Seeding	0.36 AC.	650.00	200
Landscaping	L.S.	L.S.	11,700
Structural Excavation	—		—
Rectangular Concrete Channel	—		—
Compacted Backfill	-		-
Levee Embankment	-		-
Site Preparation (Levees)	—		

Subtotal	659,800
15% Contingency	
TOTAL	758,800

USE $760,000

ENGR. (18.75%) = $140,000

OTHER INSTALL SERV. (6.25%) = $50,000

LLAGAS CREEK - MODIFIED WORK PLAN

ESTIMATE OF CHANNEL COSTS

REACH NO. 5 LLAGAS CR. Station 498 + 75 to Station 522 + 00

Item	Quantity	Unit Cost	$
Channel Excavation	55,665	1.65 C.Y.	91,847
Compacted Embankment	5,427 C.Y.	0.50 C.Y.	2,713.~~50~~
Drop Structures	976	200.00 C.Y.	195,200
Drainage Inlets	2 EA	3,000.00 EA.	6,000.~~00~~
Riprap	5,877	20.00 C.Y.	117,540
Filter Stone	3,734	15.00 C.Y.	56,010
Seeding	0.14	650.00 C.Y.	91.~~00~~
Landscaping	-	L.S.	5,400
Structural Excavation	0	3.00 C.Y.	-
Rectangular Concrete Channel	0	126.00 C.Y.	-
Compacted Backfill	0	5.00 C.Y.	-
Levee Embankment	0	1.25 C.Y.	-
Site Preparation (Levees)	0	3.00 L.F.	-

Subtotal	$ 474,801
15% Contingency	71,220
TOTAL	$ 546,021

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10-5-78

LLAGAS CREEK - MODIFIED WORK PLAN

D/S (N)
PART OF
LLAGAS CR.

ESTIMATE OF CHANNEL COSTS

REACH NO. 6A Station 522+00 to Station 582+00

Item	Quantity	Unit Cost	$
Channel Excavation	0	1.65	–
Compacted Embankment	0	0.50	–
Drop Structures	0	–	–
Drainage Inlets	8 EA.	3,000.00	24,000
Riprap	0	20.00	–
Filter Stone	0	15.00	–
Seeding	9.45 AC.	650.00	6,100
Landscaping	L.S.	L.S.	7,500
Structural Excavation	–	–	–
Rectangular Concrete Channel	–	–	–
Compacted Backfill	–	–	–
Levee Embankment	47,566 C.Y.	1.25	59,500
Site Preparation (Levees)	6,000 L.F.	3.00	18,000
		Subtotal	115,100
		15% Contingency	
		TOTAL	$130,000

ENGR. (18.75%) = $30,000

OTHER INST. SERV. (6.25%) = $10,000

WQ 125
10-5-78

LLAGAS CREEK - MODIFIED WORK PLAN

MIDDLE (M) PART OF LLAGAS CR.

ESTIMATE OF CHANNEL COSTS

REACH NO. 6A Station 582 + 02 to Station 658 + 50

Item	Quantity	Unit Cost	$
Channel Excavation	0	1.65	—
Compacted Embankment	0	0.50	–
Drop Structures	0	–	–
Drainage Inlets	4 EA.	3,000.00	12,000
Riprap	0	20.00	–
Filter Stone	0	15.00	–
Seeding	10.21 AC.	650.00	6,600
Landscaping	L.S.	L.S.	7,500
Structural Excavation	–	–	–
Rectangular Concrete Channel	–	–	–
Compacted Backfill	–	–	–
Levee Embankment	19606 C.Y.	1.25	24,500
Site Preparation (Levees)	7600 L.F.	3.00	22,800

Subtotal	73,100
15% Contingency	
TOTAL	$ 90,000

ENGR. (18.75%) = $20,000
OTHER INSTALL SERV. (6.25%) = $5,000

WS 126
11-2-78

LLAGAS CREEK - MODIFIED WORK PLAN

ESTIMATE OF CHANNEL COSTS

U/S (N) PART OF LLAGAS CR.
REACH NO. 6A Station 658 + 50 to Station 687 + 00
EXCAV. CHAN.

Item	Quantity	Unit Cost	$
Channel Excavation	35,593 C.Y.	1.65	58,700
Compacted Embankment	5,541 C.Y.	0.50	2,800
Drop Structures	0	–	–
Drainage Inlets	3 EA.	3,000.00	9,000
Riprap	7,306 C.Y.	20.00	146,100
Filter Stone	4,676 C.Y.	15.00	70,100
Seeding	0.2 Ac.	650.00	100
Landscaping	L.S.	L.S.	7,800
Structural Excavation	–	–	–
Rectangular Concrete Channel	–	–	–
Compacted Backfill	–	–	–
Levee Embankment	–	–	–
Site Preparation (Levees)	–	–	–

294,600

Subtotal

15% Contingency

TOTAL $340,000

ENGR. (18.75%) = $60,000
OTHER INSTALL. (6.25%) = $20,000

WS
11-2-78

LLAGAS CREEK - MODIFIED WORK PLAN

ESTIMATE OF CHANNEL COSTS

REACH NO. 6A U/S (N) PART OF LLAGAS CR. LEVEED CHANNEL Station 687 + 00 to Station 714 + 70

Item	Quantity	Unit Cost	$
Channel Excavation	0	—	—
Compacted Embankment	0	—	—
Drop Structures	0	—	—
Drainage Inlets	3 EA.	3,000.00	9,000
Riprap	0	—	—
Filter Stone	0	—	—
Seeding	2.6 AC.	650.00	1,700
Landscaping	L.S.	L.S.	7,800
Structural Excavation	—	—	—
Rectangular Concrete Channel	—	—	-
Compacted Backfill	—	—	—
Levee Embankment	21,503 C.Y.	1.25	26,900
Site Preparation (Levees)	2,870 L.F.	3.00	8,600

Subtotal	54,000
15% Contingency	
TOTAL	$60,000

ENGR. (18.75%) = $20,000
OTHER INSTALL. (6.25%) = $10,000

WITH REVISED STATIONING THIS IS APPROX. 714+70 TO 743+00

LLAGAS CREEK - MODIFIED WORK PLAN

ESTIMATE OF CHANNEL COSTS

REACH NO. 6b LLAGAS CR Station 703 + 70 to Station 735 + 00

Item	Quantity	Unit Cost	$
Channel Excavation	0	1.65 C.Y.	-
Compacted Embankment	0	0.50 C.Y.	-
Drop Structures	0	200.00 C.Y.	-
Drainage Inlets	3 EA	3,000.00 EA.	9,000.~~00~~
Riprap	0	20.00 C.Y.	-
Filter Stone	0	15.00 C.Y.	-
Seeding	5.10	650.00 AC.	3,315.~~00~~
Landscaping	-	L.S.	6,800
Structural Excavation	0	3.00 C.Y.	-
Rectangular Concrete Channel	0	126.00 C.Y.	-
Compacted Backfill	0	5.00 C.Y.	-
Levee Embankment	41,733	1.25 C.Y.	52,166.~~25~~
Site Preparation (Levees)	3,130	3.00 L.F.	9,390.~~00~~

Subtotal	$80,671
15% Contingency	12,101
TOTAL	$92,772

ENGR. (12.5 [illegible]

OTHER [illegible] (6.25%) = 5,800

LLAGAS CREEK - MODIFIED WORK PLAN

ESTIMATE OF CHANNEL COSTS

WEST LITTLE LLAGAS

CHANGE TO 86+40 [illegible]

REACH NO. 7a Station 11 + 00 to Station 96 + 40

Item	Quantity	Unit Cost	$
Channel Excavation	217,302	1.65 C.Y.	358,548
Compacted Embankment	13,054	0.50 C.Y.	6,527
Drop Structures	237	200.00 C.Y.	47,400
Drainage Inlets	10 EA	3 000.00 EA	30,000.00
Riprap	8,997	20.00 C.Y.	179,940
Filter Stone	6,748	15.00 C.Y.	101,220
Seeding	6.46	650.00 AC.	4,199
Landscaping	-	L.S.	15,600
Structural Excavation	0	3.00 C.Y.	-
Rectangular Concrete Channel	0	126.00 C.Y.	-
Compacted Backfill	0	5.00 C.Y.	-
Levee Embankment	0	1.25 C.Y.	-
Site Preparation (Levees)	0	3.00 L.F.	-

Subtotal	$ 743,434
15% Contingency	111,515
TOTAL	$ 854,949

LLAGAS CREEK - MODIFIED WORK PLAN

ESTIMATE OF CHANNEL COSTS

REACH NO. 76 WEST LITTLE LLAGAS Station 96 + 40 to Station 144 + 00
CHANGE TO 86+40

Item	Quantity	Unit Cost	$
Channel Excavation	71,586	1.65 C.Y	118,117
Compacted Embankment	3,982	0.50 C.Y	1,991
Drop Structures	0	200.00 C.Y.	—
Drainage Inlets	5 EA	3000.00 EA	15,000.~~00~~
Riprap	168	20.00 C.Y.	3,360
Filter Stone	126	15.00 C.Y	1,890
Seeding	4.93	650.00 AC.	3,205
Landscaping	—	L.S.	14,400
Structural Excavation	0	3.00 C.Y	–
Rectangular Concrete Channel	0	126.00 C.Y	–
Compacted Backfill	0	5.00 C.Y	–
Levee Embankment	0	1.25 C.Y.	–
Site Preparation (Levees)	0	3.00 L.F.	–

Subtotal	$ 157,963
15% Contingency	23,694
TOTAL	$ 181,657
	29,200
	210,857

CHANGE TO 86+40 ADDS
Ch. exc. - 13,900 CY @ 1.65 = 22,900
Comp. Emb. - 4,900 CY @ 0.50 = 2,500
25,400 x 1.15 = 29,200

[illegible] (18.75%) = 40,000
OTHER (6.75%) = 15,000

LLAGAS CREEK - MODIFIED WORK PLAN

ESTIMATE OF CHANNEL COSTS

WEST LITTLE LLAGAS

REACH NO. 8A Station 144 + 00 to Station 195 + 15

Item	Quantity	Unit Cost	$
Channel Excavation	0	1.65 C.Y	–
Compacted Embankment	5457	0.50 C.Y	2,729
Drop Structures	0	200.00 C.Y	–
Drainage Inlets	33 EA	3,000.00 EA	99,000.~~00~~
Riprap	0	20.00 C.Y	–
Filter Stone	0	15.00 C.Y	–
Seeding	0	650.00 Ac	–
Landscaping	–	L.S.	15,000
Structural Excavation	15,722	3.00 C.Y	47,166
Rectangular Concrete Channel	4309.2	126.00 C.Y	542,959
Compacted Backfill	5,156.	5.00 C.Y	25780.~~00~~
Levee Embankment	0	1.25 C.Y.	–
Site Preparation (Levees)	0	3.00 L.F.	–
EQUIVALENT FEDERAL RECTANGULAR CHANNEL	467	x $145 =	67,715

Subtotal $ 800,349

15% Contingency 120,052

TOTAL $ 920,401

Revised 11-27-78

LLAGAS CREEK - MODIFIED WORK PLAN

ESTIMATE OF CHANNEL COSTS

WEST LITTLE LLAGAS

REACH NO. 8b Station 195+15 to Station 227+35

Item	Quantity	Unit Cost	$
Channel Excavation	16,946 C.Y.	1.65	28,000
Compacted Embankment	2,689 C.Y.	0.50	1,300
Drop Structures	174.3 C.Y.	200.00	34,900
Drainage Inlets	3 EA.	3,000.00	9,000
Riprap	147 C.Y.	20.00	2,900
Filter Stone	110 C.Y.	15.00	1,700
Seeding	2.95 AC.	650.00	1,900
Landscaping	L.S.	L.S.	6,600
Structural Excavation	–		
Rectangular Concrete Channel	–		
Compacted Backfill	–		
Levee Embankment	–		
Site Preparation (Levees)	–		

Subtotal	86,300
15% Contingency	
TOTAL	$100,000

ENGR. (18.75 %) - $20,000

OTHER INSTAL (6.75%) - $10,000

LLAGAS CREEK - MODIFIED WORK PLAN

ESTIMATE OF CHANNEL COSTS

EAST LITTLE LLAGAS 183+00
REACH NO. 14 Station 0+00 to Station ~~180+50~~ EAST LITTLE LLAG
0+00 6+45 CORRALLITOS

Item	Quantity	Unit Cost	$
Channel Excavation	150,439	1.65 C.Y.	248,224
Compacted Embankment	3,725	0.50 C.Y.	1,863
Drop Structures	1,516	200.00 C.Y.	303,200
Drainage Inlets	20 EA	3,000.00 EA	60,000
Riprap	730	20.00 C.Y.	14,600
Filter Stone	549	15.00 C.Y.	8,235
Seeding	23.29	650.00 A.C.	15,139
Landscaping	–	L.S.	34,200
Structural Excavation	0	3.00 C.Y	-
Rectangular Concrete Channel	0	126.00 C.Y	-
Compacted Backfill	0	5.00 C.Y	-
Levee Embankment	0	1.25 C.Y	-
Site Preparation (Levees)	0	3.00 L.F	-

Subtotal	$ 685,461
15% Contingency	102,819
TOTAL	$ 788,280

LLAGAS CREEK - MODIFIED WORK PLAN

ESTIMATE OF CHANNEL COSTS

REACH NO. 15a Station CORRALLITOS 6 + 45 to Station 45 + 20

Item	Quantity	Unit Cost	$
Channel Excavation	47,935	1.65 C.Y.	79,093
Compacted Embankment	444	0.50 C.Y.	222
Drop Structures	174.3	200.00 C.Y.	348,600
Drainage Inlets	4 EA.	3,000.00 EA	12,000
Riprap	0	20.00 C.Y.	—
Filter Stone	0	15.00 C.Y.	—
Seeding	4.13	650.00 Ac.	2685
Landscaping	—	L.S.	5,900
Structural Excavation	0	3.00 C.Y.	—
Rectangular Concrete Channel	0	126.00 C.Y.	—
Compacted Backfill	0	5.00 C.Y.	—
Levee Embankment	0	1.25 C.Y.	—
Site Preparation (Levees)	0	3.00 L.F.	—

Subtotal	$ 448,500
15% Contingency	67,275
TOTAL	$ 515,775

LLAGAS CREEK - MODIFIED WORK PLAN

ESTIMATE OF CHANNEL COSTS

REACH NO. 15b CORRALLITOS & TENNANT Station 45 + 20 to Station 126 + 70

Item	Quantity	Unit Cost	$
Channel Excavation	55,107	1.65 C.Y	90,927
Compacted Embankment	7,093	0.50 C.Y	3,547
Drop Structures	0	200.00 C.Y	-
Drainage Inlets	3 EA.	3 000.00 EA.	9,000
Riprap	0	20.00 C.Y.	-
Filter Stone	0	15.00 C.Y	-
Seeding	9.99	650.00 AC.	6,494
Landscaping	-	L.S.	9,300
Structural Excavation	0	3.00 C.Y	-
Rectangular Concrete Channel	0	126.00 C.Y	-
Compacted Backfill	0	5.00 C.Y	-
Levee Embankment	0	1.25 C.Y	-
Site Preparation (Levees)	0	3.00 L.F.	-

Subtotal	$ 119,268
15% Contingency	17,890
TOTAL	$ 137,158

Excav.
Corrallitos - 55,107 × .6 = 33,000
Tennant - 55,107 × .4 = 22,000

LLAGAS CREEK - MODIFIED WORK PLAN

ESTIMATE OF CHANNEL COSTS

REACH NO. 16 EAST LITTLE LLAGAS Station ~~180+50~~ 183+00 to Station 220+85

(180+50 to 183+00 is an existing freeway culvert)

Item	Quantity	Unit Cost	$
Channel Excavation	46029	1.65 C.Y.	75,948
Compacted Embankment	1852 C.Y.	0.50 C.Y.	926
Drop Structures	0	200.00 C.Y.	—
Drainage Inlets	4 EA	3,000.00 EA.	12,000
Riprap	0	20.00 C.Y.	—
Filter Stone	0	15.00 C.Y.	—
Seeding	4.91	650.00 Ac.	3192
Landscaping	—	L.S.	4,500
Structural Excavation	0	3.00 C.Y.	-
Rectangular Concrete Channel	0	126.00 C.Y.	-
Compacted Backfill	0	5.00 C.Y.	-
Levee Embankment	0	1.25 C.Y.	—
Site Preparation (Levees)	0	3.00 L.F.	—

Subtotal	$ 96,566
15% Contingency	14,485
TOTAL	$ 111,051

SECTION VIII
SUPPLEMENTARY
CHANNEL
CONSTRUCTION
&
INSTALLATION SERVICES
COSTS
for
LOWER LLAGAS CREEK WATERSHED PROJECT

SECTION VIII Contents

Item	Page
Landscaping adjusted in supplement	139

Calif
LL Hansen 4-9-79
Landscaping

As per telephone call on 4-6-79, the Sponsors want only to landscape on the mainstream of Llagas Creek. The following calculations adjust the values in Table 2. No adjustment was made in the material submitted by DMJM

Calif   Lower Llagas Creek Watershed   140

LLHansen   4-17-79

Landscaping

Decrease all reaches by the following for removal of landscaping

Sta	Cost	Rounded
Llagas		
64+00 – 127+00	11,400	12,000 x
127+00 – 182+00	11,400	12,000 x
182+00 – 379+00	46,800	47,000
379+00 – 458+00	23,100	23 000
West Branch Llagas		
0+00 – 169+00	30,300	30,000
169+00 – 182+00	4,100	4,000
182+00 – 220+00	6,800	7,000
220+00 – 297+00	8,400	9,000 x
Lions		
182+00 – 195+00	4,000	4,000
195+00 – 281+00	–0–	–0–
281+00 – 285+00	–0–	–0–
Morcy		
211+00 – 227+00	800	1,000
227+00 – 245+00	900	1,000
North Morcy	1,600	2,000
217+00 – 233+00		
	$149,600 ck	$152,000

Calif Lower Llagas Creek Watershed 141

LL Hansen 4-17-79

Landscaping Cost

Landscaping will be accomplished only on Llagas Creek. The same total funds will be used as originally displayed by DMJM.

Total footage in Llagas Creek = 28,500 ft Upper Llagas
39,400 ft Lower Llagas
Total 67,900 ft

Cost per foot of landscaping = $\frac{317,100}{67,900}$ = $4.67/ft

Increase the Landrights Cost on Llagas by the following

Sta	Length	Cost	Cost Round
64+00 - 127+40	6340	29 608	30,000
127+40 - 182+00	5460	25498	25,000
182+00 - 379+00	19700	91,999	92,000
379+00 - 458+00	7900	36893	37,000
			$184,000

Calif
L L Hansen 4-17-79
Construction Cost

Lower Llagas Creek Watershed

Adjustment in cost due to relocation of Landscaping

Sta	Original Cost	Delition Cost	Addition Cost	Total
Llagas				
64+00 - 127+90	1,220,000	12,000	30,000	1,238,000
127+90 - 182+00	2,190,000	12,000	25,000	2,203,000
182+00 - 379+00	3,660,000	47,000	92,000	3,705,000
379+00 - 458+00	2,360,000	23,000	37,000	2,374,000
West Branch Llagas				
0+00 - 169+00	960,000	30,000		930,000
169+00 - 182+00	170,000	4,000		166,000
182+00 - 220+00	290,000	7,000		283,000
220+00 - 297+00	510,000	8,000		501,000
Lions				
182+00 - 195+00	130,000	4,000		126,000
195+00 - 281+00	430,000	-0-		430,000
281+00 - 285+00	10,000	-0-		10,000
Morey				
211+00 - 227+00	50,000	1,000		49,000
227+00 - 245+00	20,000.	1,000		19,000
North Morey				
217+00 - 233+00	40,000	2,000		38,000
	12,040	152,000	184,000	12,072,000

GT = $12,652,000

SECTION IV
SUPPLEMENTARY
CHANNEL
CONSTRUCTION
&
INSTALLATION SERVICES
COSTS
for
UPPER LLAGAS CREEK WATERSHED PROJECT

SECTION IX Contents

Item	Page
Landscaping adjusted in Supplement	145

Calif
LL Hansen 4-9-79
Landscaping

Upper Llagas Creek Watershed 145

As per telephone call on 4-6-79 the Sponsors want only to landscape on the mainstream of Llagas Creek. The following calculations are for adjusting Table 2. No adjustment was made in the material submitted by DMJM.

Calif
L L Hansen 4-17-79
Landscaping

Upper Llagas Creek Watershed

Decrease all reaches by the following for removal of Landscaping

Sta		Cost	Rounded
Llagas Creek			
458+00	– 498+15	11,700	12,000
498+15	– 522+00	5,400	6,000
522+00	– 582+00	7,500	8,000
582+00	– 658+50	7,500	8,000
658+00	– 687+00	7,800	8,000
687+00	– 714+70	7,800	8,000
714+70	– 743+00	6,800	7,000
West Little Llagas Creek			
11+00	– 96+40	15,600	16,000
96+40	– 144+00	14,400	15,000
144+00	– 195+15	15,000	15,000
195+15	– 227+35	6,600	7,000
East Little Llagas Creek			
0+00	– 183+00	34,200	35,000
183+00	– 220+85	4,500	5,000
Corrallitos Creek			
6+45	– 45+20	5,900	6,000
Corrallitos & Tennant Creeks			
45+20	– 126+70	9300	9,000
			165,000

Calif

Upper Llagas Creek Watershed

L L Hansen 4-17-79

Landscaping costs

Landscaping will be accomplished only on Llagas Creek. The same total funds will be used as originally displayed by DMJM

Total length on Llagas Creek

= 28,500 ft Upper Llagas
39,400 ft Lower Llagas

Total 67,900 ft

$$\text{Cost per foot} = \frac{317,000}{67,900} = \$4.67/\text{ft.}$$

Increase the land rights by the following

Sta	Length	Cost	Cost Rounded
458+00 - 498+15	4015	18,750	19000
498+15 - 522+00	2385	11,138	11 000
522+00 - 582+00	6000	28,020	28 000
582+00 - 658+50	7650	35,726	36 000
658+50 - 687+00	2850	13,300	13 000
687+00 - 714+70	2770	12 936	13 000
714+70 - 743+00	2830	13216	13 000
			133,000

Calif
LL Hansen 4-17-79
Construction Cost

Upper Llagas Creek Watershed 148

Adjustment in cost due to relocation of Landscaping

Station	Original Cost	Cost Delition	Cost Addition	Revised Total
Llagas				
458+00-498+15	760,000	12,000	19,000	767,000
498+15-522+00	550,000	6,000	11,000	555,000
658+50-687+00	340,000	8,000	28,000	360,000
West Little Llagas				
11+00-86+40	850,000	16,000		834,000
86+40-144+00	210,000	15,000		195,000
144+00-195+15	920,000	15,000		905,000
195+15-227+35	100,000	7,000		93,000
East Little Llagas				
0+00-183+00	790,000	35,000		735,000
183+00-220+85	110,000	5,000		105,000
Corralitos + Tennant				
0+00- 45+20	520,000	6,000		514,000
45+20-126+70	140,000	9,000		139,000
Leveed Flood Plain				
Llagas				
522+00-582+00	130,000	8000	36,000	156,000
582+00-658+20	90,000	8,000	13,000	95,000
687+00-714+70	60,000	8,000	13,000	65,000
714+70-743+00	90,000	7,000	13,000	96,000
		162,000	133,000	5,634,000

GT= 10,384,000

SECTION X

APPENDIX C

LAND RIGHTS COSTS

WL
9-78
150

LLAGAS CREEK - MODIFIED WORK PLAN

ESTIMATE OF OTHER CONSTRUCTION COSTS

(M)
PART OF LLAGAS CR.
REACH NO. 2 Station 64+00 to Station 127+40

Item	Quantity	Unit Cost	$
State and County Bridges	0		—
Private Bridges	4,060 SF	12.50	50,800
BARBED WIRE FENCE ~~RCB Culverts~~	12,680 L.F.	2.20	27,900
Relocation of Utilities			8,200

Subtotal	86,900
15% Contingency	
TOTAL	$100,000

ESTIMATED COST OF LAND PURCHASE

Item	Quantity	Unit Cost	$
Creek Bottom 85' × 6340'	12.37 AC.	100.00	1,200
Agricultural 39.93 - 12.37	27.56 AC.	3,500.00	96,500
Potential Residential (Low Value)			—
Potential Residential (Medium Value)			—
Residential/School			—
LANDSCAPING ADDITION ~~Dwellings~~ 20' × 6340'	2.91 AC.	3,500.00	10,200

TOTAL	107,900

LAND PURCHASE	- 110,000
SURVEYS, LEGAL (15%)	- 15,000
BRIDGES, ETC.	- 100,000
ENGR. FOR BRIDGES, ETC (25%)	- 25,000
TOTAL LAND RIGHTS	$250,000

WE
9-78
151

LLAGAS CREEK - MODIFIED WORK PLAN

(N) **ESTIMATE OF OTHER CONSTRUCTION COSTS**

PART OF LLAGAS CR.
REACH NO. 2 Station 127+40 to Station 182+00

Item	Quantity	Unit Cost	$
State and County Bridges	6,720 S.F.	24.00	161,300
Private Bridges	0		—
BARBED WIRE FENCE ~~RCB Culverts~~	10,920 L.F.	2.20	24,000
Relocation of Utilities			1,600

Subtotal	186,900
15% Contingency	
TOTAL	$215,000

ESTIMATED COST OF LAND PURCHASE

Item	Quantity	Unit Cost	$
Creek Bottom 85' × 1460'	8.70 AC.	100.00	900
Agricultural 34.84 - 8.70	26.14	3,500.00	91,500
Potential Residential (Low Value)			—
Potential Residential (Medium Value)			—
Residential/School			
LANDSCAPING ADDITION ~~Dwellings~~ 20' × 5460'	2.51 AC.	3,500.00	8,800

TOTAL	101,200

LAND PURCHASE — 100,000
SURVEYS, LEGAL (15%) — 15,000
BRIDGES, ETC. — 215 000
ENGR. FOR BRIDGES, ETC. (25%) - 50,000
TOTAL LAND RIGHTS $380,000

LLAGAS CREEK - MODIFIED WORK PLAN

ESTIMATE OF OTHER CONSTRUCTION COSTS

LLAGAS CR.

REACH NO. 3 Station 182 + 00 to Station 379 + 00

Item	Quantity	Unit Cost	$
State and County Bridges	16,128	24.00	387,100
Private Bridges			
Barbed Wire Fence	39,400 - F	2.20	86,700
Relocation of Utilities			~~66,300~~ 66,800
		Subtotal	540,100
		15% Contingency	81,000
		TOTAL	621,100

ESTIMATED COST OF LAND PURCHASE

Item	Quantity	Unit Cost	$
Creek Bottom			
Agricultural	110.36 Ac	3,500.00	386,300
Potential Residential (Low Value)			
Potential Residential (Medium Value)			
Landscape Addition	9.04 Ac.	3,500.00	31,600
Dwellings	1 Ea	25,000.00	25,000
		TOTAL	442,900

LAND PURCHASE -	$443,000
SURVEYS, ETC. (15%)	66,000
BRIDGES, ETC.	622,000
ENGR. FOR BRIDGES (25%)	155,000
	1,286,000

USE $1,290,000

WS
10-2-78
153

LLAGAS CREEK - MODIFIED WORK PLAN

ESTIMATE OF OTHER CONSTRUCTION COSTS

LOWER LLAGAS PART OF LLAGAS CR.
REACH NO. 4 Station 379 + 00 to Station 458 + 00

Item	Quantity	Unit Cost	$
State and County Bridges	4,480 S.F.	24.00	108,000
Private Bridges			
BARBED WIRE FENCE ~~RCB Culverts~~	15,800 L.F.	2.20	34,800
Relocation of Utilities			6,400
		Subtotal	149,200
		15% Contingency	
		TOTAL	170,000

ESTIMATED COST OF LAND PURCHASE

Item	Quantity	Unit Cost	$
Creek Bottom 50' × 8000'	14.69 AC.	100.00	1,500
Agricultural	—		—
Potential Residential (Low Value)	—		—
43.06-14.69=28.37 Potential Residential (Medium Value) 40.90-11.82=29.08	29.08 AC.	10,000.00	290,800
LANDSCAPING ADDITION ~~Residential/School~~ 20' × 7900'	3.63 AC.	10,000.00	36,300
Dwellings	3 EA.	25,000.00	75,000
		TOTAL	403,600

LAND PURCHASE	405,000
SURVEYS, LEGAL (15%)	60,000
BRIDGES, ETC.	170,000
ENGR. FOR BRIDGES (25%)	45,000
	$680,000

LLAGAS CREEK - MODIFIED WORK PLAN

ESTIMATE OF OTHER CONSTRUCTION COSTS

WEST BRANCH LLAGAS

REACH NO. 9 Station 0 + 00 to Station 169 + 00

Item	Quantity	Unit Cost	$
State and County Bridges	3,584 S.F.	24.00	86,000
R. R. Bridge	112 L.F.	300.00	33,600
Barbed Wire Fence	33,800 L.F.	2.20	74,400
Relocation of Utilities			28,800
		Subtotal	222,800
		15% Contingency	33,400
		TOTAL	256,200

ESTIMATED COST OF LAND PURCHASE

Item	Quantity	Unit Cost	$
Creek Bottom	2.58 Ac	100.00	300
Agricultural			
Potential Residential (Low Value)			
Potential Residential (Medium Value)	69.03 Ac	10,000.00	690,300
Landscaping Addition	7.76 Ac.	10,000.00	77,600
Dwellings			
		TOTAL	768,200

LAND PURCHASE	768,000
SURVEYS, ETC. (15%)	115,000
BRIDGES, ETC.	256,000
ENGR. (25%)	64,000
	1,203,000

USE $1,200,000

WE
10-3-78

LLAGAS CREEK - MODIFIED WORK PLAN

ESTIMATE OF OTHER CONSTRUCTION COSTS

"WEST BRANCH"
PART OF

REACH NO. 10 Station 169 + 00 to Station 182 + 00

Item	Quantity	Unit Cost	$
State and County Bridges	11,200 S.F.	24.00	268,800
Private Bridges			—
BARBED WIRE FENCE ~~RCB Culverts~~	2,600 L.F.	2.20	5,700
Relocation of Utilities			—
		Subtotal	274,500
		15% Contingency	
		TOTAL	$320,000

ESTIMATED COST OF LAND PURCHASE

Item	Quantity	Unit Cost	$
Creek Bottom			
Agricultural			
Potential Residential (Low Value)			
Potential Residential (Medium Value)	5.37 AC.	10,000.00	53,700
LANDSCAPING ADDITION ~~Residential~~/School 20' × 1300'	0.59 AC.	10,000.00	5900
Dwellings	1 EA.	25,000.00	25,000
		TOTAL	84,600

LAND PURCHASE -	$85,000
SURVEYS, LEGAL (15%) -	15,000
BRIDGES, ETC. -	320,000
ENGR. FOR BRIDGES (25%) -	80,000
	$500,000

WL
10-3-78

LLAGAS CREEK - MODIFIED WORK PLAN

"LIONS CREEK" ESTIMATE OF OTHER CONSTRUCTION COSTS

REACH NO. PART OF 10 Station 182+00 to Station 195+00

Item	Quantity	Unit Cost	$
State and County Bridges	2,686 S.F.	24.00	64,500
Private Bridges			—
BARBED WIRE FENCE ~~RCB Culverts~~	2,600 L.F.	2.20	5,700
Relocation of Utilities			800

Subtotal	71,000
15% Contingency	
TOTAL	$80,000

ESTIMATED COST OF LAND PURCHASE

Item	Quantity	Unit Cost	$
Creek Bottom			
Agricultural			
Potential Residential (Low Value)			
Potential Residential (Medium Value)	4.36 AC.	10,000.00	43,600
LANDSCAPING ADDITION ~~Residential/School~~ 25' × 1300'	0.60 AC.	10,000.00	6,000
Dwellings			

TOTAL	49,600

LAND PURCHASE	- 50,000
SURVEYS, LEGAL (15%)	- 10,000
BRIDGES, ETC.	- 80,000
ENGR. FOR BRIDGES ETC. (25%)	- 20,000
	$160,000

LLAGAS CREEK - MODIFIED WORK PLAN

ESTIMATE OF OTHER CONSTRUCTION COSTS

WEST BRANCH LLAGAS CR.

REACH NO. 11A Station 182 + 00 to Station 220 + 00

Item	Quantity	Unit Cost	$
State and County Bridges	6,272 S.F.	24.00	150,500
Private Bridges			
Barbed Wire Fence	7,600 L.F.	2.20	16,700
Relocation of Utilities			800
		Subtotal	168,000
		15% Contingency	25,200
		TOTAL	193,200

ESTIMATED COST OF LAND PURCHASE

Item	Quantity	Unit Cost	$
Creek Bottom	1.31 Ac	100.00	100
Agricultural			
Potential Residential (Low Value)			
Potential Residential (Medium Value)	13.17 Ac	10,000.00	131,700
Landscaping Addition	1.74 Ac.	10,000.00	17,400
Dwellings	2 Ea	25,000.00	50,000
		TOTAL	199,200

LAND PURCHASE - $199,000
SURVEYS, ETC. (15%) - 30,000
BRIDGES, ETC. - 193,000
ENGR. (25%) - 48,000
470,000

LLAGAS CREEK - MODIFIED WORK PLAN

ESTIMATE OF OTHER CONSTRUCTION COSTS

WEST BRANCH LLAGAS

REACH NO. 11B Station 220 + 00 to Station 297 + 00

Item	Quantity	Unit Cost	$
State and County Bridges	2,688 S.F.	24.00	64,500
Private Bridges			
Barbed Wire Fence	15,400 L.F.	2.20	33,900
Relocation of Utilities			
		Subtotal	98,400
		15% Contingency	14,800
		TOTAL	113,200

ESTIMATED COST OF LAND PURCHASE

Item	Quantity	Unit Cost	$
Creek Bottom	1.38 Ac	100.00	100
Agricultural			
Potential Residential (Low Value)			
Potential Residential (Medium Value)	25.55 Ac	8,000.00	204,400
Landscaping Addition	3.54 Ac.	8,000.00	28,300
Dwellings	2 Ea.	25,000.00	50,000
		TOTAL	282,800

LAND PURCHASE -	283,000
SURVEYS, ETC. (15%) -	42,000
BRIDGES, ETC.	113,000
ENGR. (25%) -	28,000
	466,000

USE $470,000

wk
10-3-78
159

LLAGAS CREEK - MODIFIED WORK PLAN

(0) ESTIMATE OF OTHER CONSTRUCTION COSTS

REACH NO. 12 PART OF LIONS CR. Station 195 + 00 to Station 281 + 00
8600 L.F

Item	Quantity	Unit Cost	$
State and County Bridges	4,096 S.F	24.00	98,300
Private Bridges			
BARBED WIRE FENCE ~~RGB Culverts~~	17,200 L.F.	2.20	37,800
Relocation of Utilities			800

Subtotal 136,900

15% Contingency

TOTAL $157,000

ESTIMATED COST OF LAND PURCHASE

Item	Quantity	Unit Cost	$
Creek Bottom	0		0
Agricultural			
Potential Residential (Low Value)			
Potential Residential (Medium Value) 21.52-0.85	20.67 AC.	10,000.00	206,700
LANDSCAPING ADDITION ~~Residential/School~~ 20' × 8600'	3.95 AC.	10,000.00	39,500
Dwellings			

TOTAL 246,200

WA
10-3-78
160

LLAGAS CREEK - MODIFIED WORK PLAN

(N) ESTIMATE OF OTHER CONSTRUCTION COSTS

PART OF LIONS CR.
REACH NO. 12 Station 281+00 to Station 285+00
400 L.F.

Item	Quantity	Unit Cost	$
State and County Bridges	0		0
Private Bridges			—
BARBED WIRE FENCE ~~RCB Culverts~~	800 L.F.	2.20	1,800
Relocation of Utilities			

Subtotal	1,800
15% Contingency	
TOTAL	$2,000

ESTIMATED COST OF LAND PURCHASE

Item	Quantity	Unit Cost	$
Creek Bottom	2.41 AC.	100.00	200
Agricultural			
Potential Residential (Low Value)			
(108-15)×400 Potential Residential (Medium Value)	0.85 AC.	10,000.00	8,500
LANDSCAPING ADDITION Residential/School 20'×400	0.18 AC.	10,000.00	1,800
Dwellings			

TOTAL	$10,500

WL
10-3-78
161

LOWER LLAGAS CREEK

REACH 12 (LIONS CREEK)

LAND RIGHTS COST - BREAKDOWN BETWEEN TYPE (O) CHANNEL AND TYPE (N) CHANNEL

	TOTAL STA 195 - 285	TYPE (O) STA 195-281	TYPE (N) STA 281 - 285
LAND PURCHASE	260,000	250,000	10,000
SURVEYS, LEGAL (15%)	40,000	39,000	1,000
BRIDGES, ETC.	160,000	157,000	3,000
ENGR. FOR BRIDGES (25%)	40,000	39,000	1,000
	500,000	485,000	15,000

WD
10-3-78
162

LLAGAS CREEK - MODIFIED WORK PLAN

(0) ESTIMATE OF OTHER CONSTRUCTION COSTS

PART OF Morey Chan
REACH NO. 135 Station 211+00 to Station 227+00

Item	Quantity	Unit Cost	$
State and County Bridges	0		—
Private Bridges			—
BARBED WIRE FENCE ~~RCB Culverts~~	3200 L.F.	2.20	7,100
Relocation of Utilities			—

Subtotal 7,100

15% Contingency

TOTAL $8,000

ESTIMATED COST OF LAND PURCHASE

Item	Quantity	Unit Cost	$
Creek Bottom	0		—
Agricultural			—
Potential Residential (Low Value)			—
Potential Residential (Medium Value) 104' x 1600'	3.82 AC.	10,000.00	38,200
LANDSCAPING ADDITION ~~Residential/School~~ 25' x 1600'	0.73 AC.	10,000.00	7,300
Dwellings	—		

TOTAL 45,500

LAND PURCHASE — 50,000
SURVEYS, LEGAL (15%) — 15,000
BRIDGES ETC. — 8,000
ENGR FOR BRIDGES ETC. — 2,000
$70,000

WQ
10-3-78
163

LLAGAS CREEK - MODIFIED WORK PLAN

(m) ESTIMATE OF OTHER CONSTRUCTION COSTS

MOREY CHAN
REACH NO. PART OF 135 Station 227+00 to Station 245+00

Item	Quantity	Unit Cost	$
State and County Bridges	2,688 S.F.	24.00	64,500
Private Bridges			—
BARBED WIRE FENCE ~~RCB Culverts~~	3,600 L.F.	2.20	7,900
Relocation of Utilities			—

Subtotal 72,400

15% Contingency

TOTAL $8

ESTIMATED COST OF LAND PURCHASE

Item	Quantity	Unit Cost	$
Creek Bottom	1.03 AC.	100.00	100
Agricultural			
Potential Residential (Low Value)			
Potential Residential (Medium Value) 6.64-3.82	2.82 AC.	10,000.00	28,200
LANDSCAPING ADDITION ~~Residential/School~~ 20' × 1800'	0.83 AC.	10,000.00	8,300
Dwellings			—

TOTAL 36,600

LAND PURCHASE	40,000
SURVEYS, LEGAL (15%)	5,000
BRIDGES, ETC.	85,000
ENGR. FOR BRIDGES (25%)	20,000
	$150,000

LLAGAS CREEK - MODIFIED WORK PLAN

ESTIMATE OF OTHER CONSTRUCTION COSTS

NORTH MOREY CHANNEL

REACH NO. 13N Station 217 + 00 to Station 233 + 00

Item	Quantity	Unit Cost	$
State and County Bridges			
Private Bridges			
Barbed Wire Fence	3,200 L.F.	2.20	7,000
Relocation of Utilities			

Subtotal	7,000
15% Contingency	1,100
TOTAL	8,100

ESTIMATED COST OF LAND PURCHASE

Item	Quantity	Unit Cost	$
Creek Bottom	—	—	
Agricultural			
Potential Residential (Low Value)			
Potential Residential (Medium Value)	3.49 Ac	10,000.00	34,900
Landscaping Addition	0.73 Ac.	10,000.00	7,300
Dwellings			

TOTAL	42,200

LAND PURCHASE -	42,000
SURVEYS, ETC. (15%) -	6,000
BRIDGES, ETC. -	8,000
ENGR. (25%) -	2,000
	58,000

USE $60,000

U/2
10-2-70

LLAGAS CREEK - MODIFIED WORK PLAN

UPPER LLAGAS ESTIMATE OF OTHER CONSTRUCTION COSTS

PART OF LLAGAS CR.
REACH NO. 4 Station 458 + 00 to Station 498 + 15

Item	Quantity	Unit Cost	$
State and County Bridges	4,480 S.F.	24.00	108,000
Private Bridges			
BARBED WIRE FENCE ~~RCB Culverts~~	8,030 L.F.	2.20	17,700
Relocation of Utilities			500

Subtotal 126,200

15% Contingency

TOTAL 150,000

ESTIMATED COST OF LAND PURCHASE

Item	Quantity	Unit Cost	$
Creek Bottom 80' x 4000'	7.35 AC.	100.00	700
Agricultural	–		
Potential Residential (Low Value)	–		–
Potential Residential (Medium Value) 19.17 - 7.35	11.82 AC.	10,000.00	118,200
LANDSCAPING ADDITION ~~Residential/School~~ 20' x 4015'	1.84 AC.	10,000.00	18,400
Dwellings	0		–

TOTAL 137,300

LAND PURCHASE	- 140,000
SURVEYS, LEGAL (15%)	- 20,000
BRIDGES, ETC.	- 150,000
ENGR. FOR BRIDGES ETC. (25%)	- 40,000
	$ 350,000

LLAGAS CREEK - MODIFIED WORK PLAN

ESTIMATE OF OTHER CONSTRUCTION COSTS

LLAGAS CREEK

REACH NO. 5 Station 458 + 00 to Station 522 + 00

Item	Quantity	Unit Cost	$
State and County Bridges			
Private Bridges			
Barbed Wire Fence	12,800 L.F.	2.20	28,200
Relocation of Utilities			500
		Subtotal	28,700
		15% Contingency	4,300
		TOTAL	33,000

ESTIMATED COST OF LAND PURCHASE

Item	Quantity	Unit Cost	$
Creek Bottom	3.67 Ac	100.00	400
Agricultural			
Potential Residential (Low Value)			
Potential Residential (Medium Value)	6.87 Ac	10,000.00	68,700
Landscaping Addition	1.10 Ac.	10,000.00	11,000
Dwellings			
		TOTAL	80,100

LAND PURCHASE -	80,000
SURVEYS, ETC. (15%) -	12,000
BRIDGES, ETC. -	33,000
ENGR. (25%) -	8,000
	133,000

USE $130,000

LLAGAS CREEK - MODIFIED WORK PLAN

D/S (N) ESTIMATE OF OTHER CONSTRUCTION COSTS
LLAGAS CR.

REACH NO. PART OF 6A Station 522+00 to Station 582+00

Item	Quantity	Unit Cost	$
State and County Bridges			
Private Bridges			
BARBED WIRE FENCE ~~RCB Culverts~~	12,000 L.F.	2.20	26,400
Relocation of Utilities			1,500
		Subtotal	27,900
		15% Contingency	
		TOTAL	$ 32,100

ESTIMATED COST OF LAND PURCHASE

Item	Quantity	Unit Cost	$
Creek Bottom $\frac{6000}{19270}$ × 44.7%	13.94 AC.	100.00	1,400
Agricultural			
LANDSCAPING ADDITION ~~Potential Residential (Low Value)~~	2.09 AC.	10,000.00	20,900
Potential Residential (Medium Value)	37.47 AC.	10,000.00	374,700
Residential/School			
Dwellings			
		TOTAL	397,000

LAND PURCHASE	397,000
SURVEYS, LEGAL (15%)	60 000
FENCE, UTILS.	32,000
L. SC (25%)	8 000
	497 000

USE $500,000

WS 168
10-6-78

LLAGAS CREEK - MODIFIED WORK PLAN

MIDDLE (M) ESTIMATE OF OTHER CONSTRUCTION COSTS
PART OF LLAGAS CR.
REACH NO. 6A Station 582+50 to Station 658+50

Item	Quantity	Unit Cost	$
State and County Bridges			
Private Bridges			
BARBED WIRE FENCE ~~RCB Culverts~~	15300 L.F.	2.20	33,700
Relocation of Utilities			

Subtotal	33,700
15% Contingency	
TOTAL	38,700

ESTIMATED COST OF LAND PURCHASE

Item	Quantity	Unit Cost	$
Creek Bottom 7650/19770 = 44.7%	7.77 AC.	100.00	1,800
Agricultural			
LANDSCAPING ADDITION ~~Potential Residential~~ ~~(Low-Value)~~	2.08 AC.	10,000.00	29,800
Potential Residential (Medium Value)	9.78 AC.	10,000.00	107,800
Residential/School			
BUSINESS ~~Dwellings~~	1 EA.	50,000.00	50,000

TOTAL	180,400

LAND PURCHASE	- 180,400
SURVEYS, LEGAL (15%)	- 27,000
FENCES	- 38,700
ENGR. (25%)	- 10,000
	$256,000 SA $260,000

WZ
11-2-78
169

LLAGAS CREEK - MODIFIED WORK PLAN

ESTIMATE OF OTHER CONSTRUCTION COSTS

U/S (N) PART OF REACH NO. 6A EXCAV. CHAN

LLAGAS CR. Station 658 + 50 to Station 687 + 00

Item	Quantity	Unit Cost	$
State and County Bridges			—
Private Bridges			—
BARBED WIRE FENCE ~~RCB Culverts~~	5,700 L.F	2.20	12,500
Relocation of Utilities			4,500
		Subtotal	17,000
		15% Contingency	
		TOTAL	19,600

ESTIMATED COST OF LAND PURCHASE

Item	Quantity	Unit Cost	$
Creek Bottom 2850 / 19,270 × 44.76	6.62 AC.	100.00	700
Agricultural			
LANDSCAPING ADDITION ~~Potential Residential (Low Value)~~	2.09 AC.	10,000.00	20,900
Potential Residential (Medium Value)	2.14 AC	10,000.00	21,400
~~Residential/School~~ Industrial	3.93 AC.	20,000.00	78,600
Dwellings			
		TOTAL	121,600

LAND PURCHASE -	$122,000
SURVEYS, LEGAL (15%) -	18,000
FENCE, UTILS -	20,000
ENGR. (25%) -	5,000
	$165,000

SAY $170,000

W2
11-2-78
170

LLAGAS CREEK - MODIFIED WORK PLAN

U/S (N) ESTIMATE OF OTHER CONSTRUCTION COSTS

REACH NO. PART OF 6A LEVEED CHAN   LLAGAS CR. Station 687+00 to Station 714+70

Item	Quantity	Unit Cost	$
State and County Bridges			—
Private Bridges			—
BARBED WIRE FENCE ~~RCB Culverts~~	5,540 L.F.	2.20	12,200
Relocation of Utilities			—
		Subtotal	12,200
		15% Contingency	
		TOTAL	14,000

ESTIMATED COST OF LAND PURCHASE

Item	Quantity	Unit Cost	$
Creek Bottom $\frac{2770}{19,270} \times 44.7\%$	6.43 AC.	100.00	600
Agricultural			
LANDSCAPING ADDITION ~~Potential Residential (Low Value)~~	2.08 AC.	10,000.00	20,800
Potential Residential (Medium Value)	2.70 AC.	10,000.00	27,000
Correction for add'l length 80'×1100' ~~Residential/School~~	2.0 AC.	10,000.00	20,000
~~Dwellings~~			
		TOTAL	68,400

LAND PURCHASE -	68,000
SURVEYS, LEGAL (15%) -	10,000
FENCE	14,000
ENGR. (25%) -	4,000
	96,000

SAY $100,000

WITH REVISED STATIONING THIS IS APPROX 714+70 TO 743+00

LLAGAS CREEK - MODIFIED WORK PLAN

ESTIMATE OF OTHER CONSTRUCTION COSTS

LLAGAS CREEK

REACH NO. 6B Station 703 + 70 to Station 735 + 00

Item	Quantity	Unit Cost	$
State and County Bridges			
Private Bridges			
Barbed Wire Fence	6,260 LF	2.20	13,800
Relocation of Utilities			
Subtotal			13,800
15% Contingency			2,100
TOTAL			15,900

ESTIMATED COST OF LAND PURCHASE

Item	Quantity	Unit Cost	$
Creek Bottom	4.22 Ac	100.00	400
Agricultural			
Potential Residential (Low Value)			
Potential Residential (Medium Value)	12.53 Ac.	10,000.00	125,300
Landscaping Addition	1.44 Ac.	10,000.00	14,400
Dwellings			
TOTAL			140,100

LAND PURCHASE -	140,000
SURVEYS, ETC. (15%) -	21,000
BRIDGES, ETC. -	16,000
ENGR. (25%) -	4,000
	181,000

USE $180,000

171 A

LLAGAS CREEK - MODIFIED WORK PLAN

ESTIMATE OF OTHER CONSTRUCTION COSTS

WEST LITTLE LLAGAS CHANGE TO 86+40

REACH NO. 7A Station 11 + 00 to Station 96 + 40

Item	Quantity	Unit Cost	$
State and County Bridges			
Private Bridges	700 SF.	12.50	~~8,800~~ TO 7B
RCB Culverts 65 CY TO 7B	252 ~~317~~ C.Y.	145.00	36,500 ~~46,000~~
Barbed Wire Fence	15,080 ~~17,080~~ L.F.	2.20	33,200 ~~37,600~~

Subtotal 69,700 ~~92,400~~

15% Contingency ~~13,900~~

TOTAL $80,000 ~~106,300~~

ESTIMATED COST OF LAND PURCHASE

Item	Quantity	Unit Cost	$
Creek Bottom			
Agricultural			
Potential Residential (Low Value)			
Potential Residential (Medium Value)	30.07 Ac	10,000.00	300,700
Landscaping Addition	3.92 Ac.	10,000.00	39,200
Dwellings	1 Ea	25,000.00	~~25,000~~

THE CHANGE REDUCES THIS VALUE

TOTAL ~~364,900~~

$340,000

LAND PURCH	340,000
SURVEYS (15%)	51,000
BRIDGES ETC	80,000
ENGR. (25%)	20,000
	$490,000

LLAGAS CREEK - MODIFIED WORK PLAN

WEST LITTLE LLAGAS

ESTIMATE OF OTHER CONSTRUCTION COSTS

CHANGE TO 86+40

REACH NO. 7B Station 96 + 40 to Station 144 + 00

Item	Quantity	Unit Cost	$
Utility Relocs. ~~State and County Bridges~~			18,700
Private Bridges	9,100 S.F ~~8,400 S.F.~~	12.50	113,800 ~~105,000~~
RCB Culverts	227 ~~162~~ C.Y.	145.00	32,900 ~~23,500~~
Fence ~~Relocation of Utilities~~	11,520 ~~9,520~~ L.F.	2.20	25,300 ~~20,900~~

Subtotal	190,700 ~~149,400~~
15% Contingency	~~22,400~~
TOTAL	~~171,800~~ $220,000

ESTIMATED COST OF LAND PURCHASE

Item	Quantity	Unit Cost	$
Creek Bottom	1.94	100.00	200
Agricultural			
Potential Residential (Low Value)			
Potential Residential (Medium Value)	13.02 Ac	10,000.00	130,200
Landscaping Addition	2.19 Ac.	10,000.00	21,900
Dwellings	2 Ea	25,000.00	50,000
		TOTAL	202,300
			56,700
			259,000

CHANGE TO 86+40 ADD

3.17 Ac @ $10,000 31,700

1 Dwelling 25,000

56,700

LAND PURCH. - 259,000
SURVEYS, ETC (15%) 90,000
BRIDGES, ETC. -220,000
[illegible] 20,000
} $589,000

173

LLAGAS CREEK - MODIFIED WORK PLAN

ESTIMATE OF OTHER CONSTRUCTION COSTS

WEST LITTLE LLAGAS

REACH NO. 8A Station 144 +00 to Station 195 + 15

Item	Quantity	Unit Cost	$
Chain Link Fence	10,230 L.F.	4.00	40,900
Private Bridges			
RCB Culverts	344 C.Y.	145.00	49,900
Relocation of Utilities			33,600
		Subtotal	124,400 ~~90,800~~
		15% Contingency	~~13,600~~
		TOTAL	~~104,400~~ 143,000

ESTIMATED COST OF LAND PURCHASE

Item	Quantity	Unit Cost	$
Creek Bottom	1.17 Ac	100.00	100
Agricultural			
Potential Residential (Low Value)			
Landscaping Additional	2.35 Ac.	13,000.00	30,600
Residential/School	3.78 Ac.	13,000.00	49,100
Dwellings	1 Ea.	25,000.00	25,000
		TOTAL	104,800

LAND PURCHASE -	105,000
SURVEYS, ETC (15%) -	16,000
BRIDGES, ETC. -	143,000
ENGR. (25%) -	36,000
	300,000

Revised 11-27-78
WK 174

LLAGAS CREEK - MODIFIED WORK PLAN

ESTIMATE OF OTHER CONSTRUCTION COSTS

WEST LITTLE LLAGAS

REACH NO. 8b Station 195 + 15 to Station 227+ 35

Item	Quantity	Unit Cost	$
BARBED WIRE FENCE ~~State and County Bridges~~	6,440 L.F.	2.20	14,200
Private Bridges	480 S.F.	12.50	6,000
RCB Culverts	57 C.Y.	145.00	8,300
Relocation of Utilities	L.S.	L.S.	600
		Subtotal	29,100
		15% Contingency	
		TOTAL	$34,000

ESTIMATED COST OF LAND PURCHASE

Item	Quantity	Unit Cost	$
Creek Bottom	0.46 AC	100	100
Agricultural			
Potential Residential (Low Value)			
LANDSCAPING ADD'L. ~~Potential Residential (Medium Value)~~	1.48 AC	13,000	19,200
Residential/School	6.93 AC.	13,000	90,100
Dwellings			
		TOTAL	109,400

LAND PURCHASE -	110,000
SURVEYS, ETC. (15%) -	16,000
BRIDGES, ETC. -	34,000
ENGR. (25%) -	9,000
	169,000

USE $170,000

LLAGAS CREEK - MODIFIED WORK PLAN

ESTIMATE OF OTHER CONSTRUCTION COSTS

EAST LITTLE LLAGAS

REACH NO. 14 Station 0 + 00 to Station ~~180 + 50~~ 183+00 East Little Llagas

0 + 00 6 + 45 Corrallitos

Item	Quantity	Unit Cost	$
State and County Bridges			
Private Bridges	840 S.F.	12.50	10,500
RCB Culverts	954 C.Y.	145.00	138,300
Relocation of Utilities			5,500
Barbed Wire Fence	37,390 L.F.	2.20	82,300
	Subtotal		236,600
	15% Contingency		35,500
	TOTAL		272,100

ESTIMATED COST OF LAND PURCHASE

Item	Quantity	Unit Cost	$
Creek Bottom	5.05 Ac	100.00	500
Agricultural			
Potential Residential (Low Value)			
Potential Residential (Medium Value)	63.34 Ac	10,000.00	633,400
Landscaping Addition	8.58 Ac	10,000.00	85,800
Dwellings			
	TOTAL		719,700

LAND PURCHASE -	720,000
SURVEYS, ETC. (15%) -	108,000
BRIDGES, ETC -	272,000
ENGR. (25%) -	68,000
	1,168,000

Say $1,170,000

LLAGAS CREEK - MODIFIED WORK PLAN

ESTIMATE OF OTHER CONSTRUCTION COSTS

REACH NO. 15A CORRALLITOS Station 6 + 45 to Station 45 + 20

Item	Quantity	Unit Cost	$
State and County Bridges			
Barbed Wire Fence	7,750	2.20	17,100
RCB Culverts	136 C.Y.	145.00	19,700
Relocation of Utilities			400
		Subtotal	37,200
		15% Contingency	5,600
		TOTAL	42,800

ESTIMATED COST OF LAND PURCHASE

Item	Quantity	Unit Cost	$
Creek Bottom	0.95 Ac	100.00	100
Agricultural			
Potential Residential (Low Value)			
Potential Residential (Medium Value)	11.41 Ac	10,000.00	114,100
Landscape Addition	1.78 Ac.	10,000.00	17,800
Dwellings			
		TOTAL	132,000

LAND PURCHASE -	132,000
SURVEYS, ETC. (15%) -	20,000
BRIDGES, ETC. -	43,000
ENGR. (25%). -	11,000
	206,000

USE $210,000

LLAGAS CREEK - MODIFIED WORK PLAN

ESTIMATE OF OTHER CONSTRUCTION COSTS

CORRALLITOS & TENNANT

REACH NO. 15B Station 45 + 20 to Station 77 + 50

Item	Quantity	Unit Cost	$
Barbed Wire Fence	16,300 L.F.	2.20	35,900
Private Bridges	840 S.F.	12.50	10,500
RCB Culverts	569 C.Y.	145.00	82,500
Relocation of Utilities			1,500
		Subtotal	130,400
		15% Contingency	19,600
		TOTAL	150,000

ESTIMATED COST OF LAND PURCHASE

Item	Quantity	Unit Cost	$
Creek Bottom	1.58 Ac	100.00	200
Agricultural			
Potential Residential (Low Value)			
Potential Residential (Medium Value)	21.04 Ac	10,000.00	210,400
Landscape Addition	3.74 Ac.	10,000.00	37,400
Dwellings			
		TOTAL	248,000

LAND PURCHASE -	248,000
SURVEYS, ETC. (15%)	37,000
BRIDGES, ETC.	150,000
ENGR (25%) -	38,000
	473,000

USE $470,000

LLAGAS CREEK - MODIFIED WORK PLAN

ESTIMATE OF OTHER CONSTRUCTION COSTS

EAST LITTLE LLAGAS 183+00

REACH NO. 16 Station ~~180 + 50~~ to Station 220 + 85

Item	Quantity	Unit Cost	$
State and County Bridges			
Barbed Wire Fence	8,070 L.F.		17,800
RCB Culverts	130 C.Y.	145.00	18,900
Relocation of Utilities			500

Subtotal	37,200 ~~36,700~~
15% Contingency	~~5,500~~
TOTAL	43,000 ~~42,200~~

ESTIMATED COST OF LAND PURCHASE

Item	Quantity	Unit Cost	$
Creek Bottom	1.29 Ac	100.00	100
Agricultural			
Potential Residential (Low Value)			
Potential Residential (Medium Value)	9.27 Ac	10,000.00	92,700
Landscape Addition	1.85 Ac.	10,000.00	18,500
Dwellings			

TOTAL	111,300

LAND PURCHASE - 111,000
SURVEYS, ETC. (15%) - 17,000
BRIDGES, ETC. - 43,000
ENGR. (25%) - 11,000
182,000 USE $180,000

SECTION XI

CHANNEL

LANDRIGHTS COSTS

for

LOWER LLAGAS CREEK WATERSHED PROJECT

SECTION XI Contents

Item	Page
Lower Llagas 'Fensing adjustment	181
Landscape Right of Way Cost Removed	182

Calif
L L Hansen 4-16-79
Fencing

Lower Llagas Watershed

181

As per discussion with J. Richardson of Santa Clara Valley Water District on 4-13-79, the following course of action is taken.

The Work Plan with associated costs calls for fencing the entire length of the channel improvement. It is now changed to only adjust the location of the existing fence where it is required by construction.

This action results in a cost reduction. However, at this time the exact location of the reaches requiring refencing is indeterminate. Therefore the cost data in the plan is not changed.

Cal.F

Lower Llagas Creek Watershead

L L Hansen 4-16-79

Landscape Rights of Way Costs removed from Plan

SCVWD plans to do the landscaping on the existing right of way.

Therefore the rights of way costs in the following section sections are eliminated.

Sta	Area (acres)	Cost		Total Land Rights
Llagas Creek				
64+00 - 127+40	2.91	10,200		240,000
127+40 - 182+00	2.51	8,800		371,000
182+00 - 379+00	9.04	31,600		1,258,000
379+00 - 458+00	3.63	36,300		644,000
	(18.09)	(86,900)	87	(2,513,000)
West Branch Little Llagas Creek				
0+00 - 169+00	7.76	77,600		1,122,000
169+00 - 182+00	0.59	5,900		494,000
182+00 - 220+00	1.74	17,400		453,000
220+00 - 297+00	3.54	28,300		442,000
	(13.63)	(129,200)	129	(2,511,000)
Lions Creek				
182+00 - 195+00	0.60	6,000		1,54,000
195+00 - 281+00	3.95	39,500		445,000
281+00 - 285+00	0.18	1,800		13,000
	(4.73)	(47,300)	48	(612,000)
Morey Channel				
211+00 - 227+00	0.73	7,300		63,000
227+00 - 245+00	0.83	8,300		142,000
	(1.56)	(15,600)	15	(205,000)
North Morey Channel				
217+00 - 233+00	(0.73)	(7,300)	7	(53,000)
	(38.74)	(286,300)	286	5,894,000

SECTION XII

CHANNEL
LANDRIGHTS COSTS
for
UPPER LLAGAS CREEK WATERSHED PROJECT

SECTION XII Contents

Item	Page
Upper Llagas fencing adjusted	185
Landscaping Right of Way Cost Removed	186

Calif
LL Hansen 4-16-79
Fencing

Upper Llagas Watershed

As per discussion with J. Richardson of Santa Clara Valley Water District on 4-13-79, the following course of action is taken.

The Work Plan with associated costs calls for fencing the entire length of the channel improvement. It is now changed to only adjust the location of the existing fence where required by the construction and to install fencing on the rectangular concrete section.

This action results in a cost decrease. However at this time the exact location of the reaches requiring refencing is indeterminate. Therefore the cost data in the plan is not changed.

Calif

Upper Llagas Watershed

Ld Hansen 4-16-79

Landscape Rights of Way Costs

SCVWD plans to do the landscaping on the existing right of way.
Therefore the right of way costs in the following section are eliminated.

Reach	Area (acre)	Cost		Revised Land Rights
Llagas Creek				
458+00 – 498+15	1.84	18,400		332,000
458+00 – 522+00	1.10	11,000		119,000
522+00 – 582+00	2.09	20,900		479,000
582+00 – 658+50	2.08	20,800		239,000
658+50 – 687+00	2.09	20,900		149,000
687+00 – 714+00	2.08	20,800		79,000
714+00 – 743+00	1.44	14,400		166,000
	(12,72)	(127,200) ✓	127	(1,563,000)
West Little Llagas Creek				
11+00 – 86+40	3.92	39,200		451,000
86+40 – 144+00	2.19	21,900		558,000
144+00 – 195+15	2.35	30,600		269,000
195+15 – 227+35	1.48	19,200		151,000
	(9.94)	(110,900)	111	(1,429,000)
East Little Llagas Creek				
0+00 – 183+00	8.58	85,800		1,084,000
183+00 – 220+85	1.85	18,500		161,000
	(10.43)	(104,300)	104	(1,245,000)
Corrallitos Creek				
6+45 – 45+20	(1.78)	(17,800)	18	(192,000)
Corrallitos + Tennant Creek				
45+20 – 77+50	(3.74)	(37,400)	37	(433,000) 1/
	38.61	397,600		4,862,000

1/ reach total is to Sta 126+70

SECTION XIII

APPENDIX D

DMJM

DANIEL, MANN, JOHNSON, & MENDENHALL

PLANNING • ARCHITECTURE • ENGINEERING • SYSTEMS • ECONOMICS

LLAGAS CREEK R/W.

JOB NO. 6209-1-1

SHEET NO. 1 OF 5

DESIGNED BY M.S.

DATE MAY 27, 1976

APPROVED

SELECTED ALTERNATE

REACH Nº	STATION BEGIN	STATION END	LENGTH	b or f	d or H	W	GROSS ACRES
	LOWER LLAGAS CREEK						
2	64+00	93+00	2900'	140'	14'	264'	17.58
	93+00	121+00	2800'	155'	15'	283'	18.19 } 39.93
	121+00	127+40	640'	155'	15'	283'	4.16
	127+40	150+00	2260'	150'	15'	278'	14.42
	150+00	160+00	1000'	150'	15'	278'	6.38 } 34.84
	160+00	182+00	2200'	150'	15'	278'	14.04
							74.77
3	182+00	190+80	880'	190'	16'	322'	6.51
	190+80	294+00	10320'	120'	14'	244'	57.80
	294+00	379+00	8500'	120'	12'	236'	46.05
							110.36
4	379+00	386+00	700'	120'	11'	232'	3.72
	386+00	420+00	3400'	120'	12'	236'	18.42
	420+00	441+00	2100'	140'	14'	264'	12.73
	441+00	458+00	1700'	110'	9'	214'	8.35
							43.22
	~~UPPER~~ LLAGAS CREEK						
	458+00	498+15	4015'	110'	9'	214'	19.72
5	498+15	513+00	1485'	90'	9'	194'	6.61
	513+00	522+00	900'	90'	8'	190'	3.93
							10.54

DMJM

DANIEL, MANN, JOHNSON, & MENDENHALL

PLANNING • ARCHITECTURE • ENGINEERING • SYSTEMS • ECONOMICS

LLAGAS CREEK R/W.	JOB NO. 6209-1-1
	SHEET NO. 2 OF 5
	DESIGNED BY M.S.
	DATE MAY 27, 1976
SELECTED ALTERNATE	APPROVED

REACH Nº	STATION		LENGTH	b or f	d or H	W	GROSS ACRES
	BEGIN	END					
	~~UPPER~~ LLAGAS CREEK						
6A	522+00	552+00	3000	250	5	338'	23.28
	552+00	580+00	2800	340	5	428'	27.51
	580+00	582+00	200	NATURAL 80	5	136'*	0.62
	582+00	605+00	2300	NATURAL 60	7	120'*	6.34
	605+00	625+50	2050	NATURAL 100	7	160'*	7.53
	625+50	650+00	2450	NOMINAL 100	2	164'	9.22
	650+00	658+50	850	200	4	280'	5.46
	658+50	675+00	1650	90	9	194'	7.35
	675+00	687+00	1200	90	9	194'	5.34
	687+00	691+00	400	180	5	238'	2.19
	691+00	703+70	1270	180	5	238'	6.94
							101.78
				(*Includes 18' R/W each side for maintenance)			
6b	703+70	724+50	2080	145	5	233'	11.13
	724+50	735+00	1050	145	5	233'	5.62
							16.75
	WEST LITTLE LLAGAS CREEK						
7A	~~0+00~~	~~11+50~~	~~1150'~~	~~70'~~	~~7'~~	~~166'~~	~~4.38~~
	11+00	46+50	3550'	75'	6'	167'	13.60
	46+50	75+50	2900'	60'	5'	148'	9.85
	75+50	96+40	2090'	50'	5'	138'	6.62
							30.07
7b	96+40	130+20	3380'	50'	5'	138'	10.71
	130+20	144+00	1380'	50'	4'	134'	4.25
							14.96

DMJM
DANIEL. MANN. JOHNSON. & MENDENHALL
PLANNING ARCHITECTURE ENGINEERING SYSTEMS ECONOMICS

LLAGAS CREEK R/W.	JOB No. 6209-1-1
	SHEET No. 3 OF 5
	DESIGNED BY M.S.
	DATE MAY 27, 1976
SELECTED ALTERNATE	APPROVED

REACH No	STATION BEGIN	STATION END	LENGTH	b or f	d or H	W	GROSS ACRES
	WEST LITTLE LLAGAS CREEK						
8A	144+00	173+93	2993	CONC. 18	5'	43'	2.95
	173+93	195+15	2122	CONC. 16	5'	41'	2.00
							4.95
8b	195+15	204+00	885	CONC. 12	3'	37'	0.75
	204+00	227+35	2335	16	4'	100'	5.36
							6.11
	WEST BRANCH LLAGAS CREEK						
9	0+00	55+00	5500'	90'	9'	194'	24.50
	55+00	169+00	11400'	80'	8'	180'	47.11
							71.61
10	169+00	182+00	1300'	80'	8'	180'	5.37
	LIONS CREEK						
	182+00	195+00	1300'	50'	7'	146'	4.36
	WEST BRANCH LLAGAS CREEK						
11A	182+00	220+00	3800'	70'	7'	166'	14.48
11b	220+00	226+00	600'	60'	7'	156'	2.15
	226+00	297+00	7100'	60'	6'	152'	24.78
							26.93

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LLAGAS CREEK R/W.

SELECTED ALTERNATE

JOB NO. 6209-1-1

SHEET NO. 4 OF 5

DESIGNED BY M. S.

DATE MAY 27, 1976

APPROVED

REACH Nº	STATION BEGIN	STATION END	LENGTH	b or f	d or H	W	GROSS ACRES
	LIONS CREEK						
12	195+00	211+00	1600'	50'	7'	146'	5.36
	211+00	235+00	2400'	20'	6'	112'	6.17
	235+00	245+00	1000'	20'	5'	108'	2.48
	245+00	285+00	4000'	20'	5'	108'	9.92
							23.93
	MOREY CHANNEL						
13	211+00	230+00	1900'	20'	4'	104'	4.54
	230+00	245+00	1500'	15'	2'	91'	3.13
							7.67
	NORTH MOREY CHANNEL						
13	217+00	233+00	1600'	15'	3'	95'	3.49
	EAST LITTLE LLAGAS CREEK						
14	0+00	6+00	600'	80'	7'	176'	2.42
	6+00	32+00	2600'	85'	6'	177'	10.56
	32+00	52+00	2000'	85'	6'	177'	8.13
	52+00	121+50	6950'	70'	6'	162'	25.85
	121+50	180+50	5900'	55'	5'	143'	19.37
							66.33
	CORRALLITOS CREEK						
	0+00	6+45	645'	55'	4'	139'	2.06

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LLAGAS CREEK R/W.

SELECTED ALTERNATE

JOB NO. 6209-1-1

SHEET NO. 5 OF 5.

DESIGNED BY M. S.

DATE MAY 27, 1976

APPROVED

REACH No	STATION		LENGTH	b or f	d or H	W	GROSS ACRES
	BEGIN	END					
	CORRALLITOS CREEK						
15A	6+45	10+00	355'	55'	4'	139'	1.13
	10+00	45+20	3520'	55'	4'	139'	11.23
							12.36
15b	45+20	77+50	3230'	55'	4'	139'	10.31
	TENNANT CREEK						
	77+50	126+70	4920'	25'	4'	109'	12.31
	EAST LITTLE LLAGAS CREEK						
16	180+50	220+85	4035	30'	4'	114'	10.56
				GRAND TOTAL:			705.00

SECTION XIV

APPENDIX E

SHEETS 194-199 ARE THE LANDSCAPING PLAN & COST ESTIMATE PREPARED BY DMJM. THE PLAN ENVISIONED TREE CLUSTERS ALONG ALL CHANNELS. THE SPONSORS AND SCS LATER AGREED IT WOULD BE PREFERABLE TO CONCENTRATE THE LANDSCAPING EFFORT ON THE MAIN LLAGAS CHANNEL. THE DMJM PLAN IS THUS SUPERSEDED, BUT IS RETAINED HERE FOR REFERENCE. THE REVISED LANDSCAPING COST DISTRIBUTION IS IN SECTIONS VIII AND IX

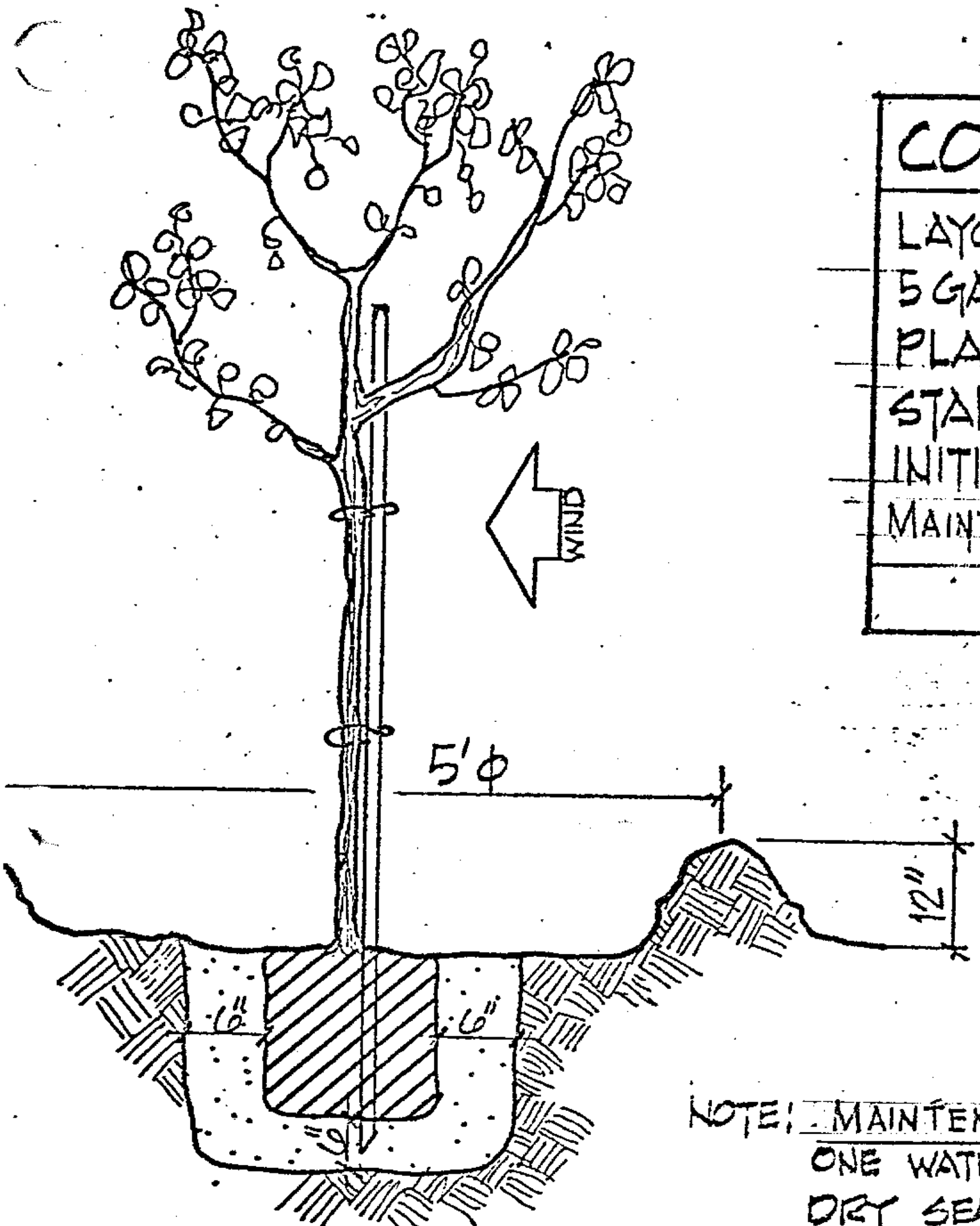
WR 4-26-79

SUMMARY OF

LANDSCAPE SITE AND VISUAL ANALYSIS

REACH 1	Rural-meadow/lush willows and cattails/creek bed wildlife/good flora and fauna habitat/water in channel/plant trees at bridge to break straight visual line of levee at point of public contact.
REACH 2	Lush creekbed vegetation - willows, black walnut, smoke tree/good wildlife habitat/ keep density of trees if possible. Cottonwood/poplars/elderberry/existing water - fishes/ retain maximum existing growth-levee ?/upstream from dump creek parallels slough - use for flood overflow?/ rural-meadow-farm.
REACH 3	Keep trees at bridges/existing wildlife habitat in lush channel bottom growth/block walnut, oaks, smoke tree/ willow/no water in channel. Sycamore/no excavation at south end. Rural-farm-meadow.
REACH 4	Rural-farm-meadow/willows-cattails-sycamore. Good wildlife habitats/keep strong tree clusters at bridge.
REACH 5	Engineered cut/rural meadow/freeway intersect high public impact/plant heavy/ strong tree clumps at bridge, occassional clumps along channel.
REACH 6a	Rural residential/existing creek bed trail/good tree growth-creek bed vegetation. Willows-oaks-alders-sycamores. Keep existing trees - area in general has good feeling and landscape character. Water in channel-fishes/wildlife habitat.
REACH 6b	Rural-residential/black walnut-alder-sycamore-willow-blackberry/water-fishes. Good feeling to area as is/ wildlife habitat.
REACH 7a	Rural meadow-scattered housing/farms/small existing channel/no water.
REACH 7b	Rural residential/local garden trees/existing channel is small.

REACH 7c	Rural-meadow-farm/existing channel is road-side ditch.
REACH 8a	Residential-Morgan Hill/no water in channel/cattails, weeds. Heavy planting for major new channel work.
REACH 8b	Small valley/rural-scattered residential. Existing channel is small and blends with landscape.
REACH 9	Channel excavated/major public impact along freeway-heavy landscape. Some trees planted (small)- Monterey pine, Eucalyptus/plant strong tree clusters.
REACH 10	Rural residential/existing small ditch blends with landscape. New channel work need heavy plantings at bridge. How will driveway culverts be handled.
REACH 11a	Rural-open meadow-orchard. Small existing ditch blends with landscape/willows-grasses/wildlife habitat.
REACH 11b	Rural-orchard-open meadow/small existing ditch blends with landscape/willows.
REACH 12	Rural-residential-open meadow ditch/grasses/how will driveway culverts be handled? Extensive excavation will be highly visible.
REACH 13	Rural-residential/small excavated ditch with rough banks.
REACH 14	Rural-meadow/section of freeway high public impact/ sections of channel piled with 2' diameter stones/strong tree clusters at bridge and occassionally along channel.
REACH 15a	Rural-orchard-meadow-scattered homes/small existing channel blends with landscape. Willows-grasses in channel/wildlife habitat.
REACH 15b	Rural residence-new tract residences. Will other areas of Llagas Creek that are now open meadow-orchard become housing in the future? If so, then strong tree clusters are important landscape elements/existing small channel blends with landscape/weeds and shrubs - wildlife habitat.
REACH 16	Existing excavated channel - rural residence - open meadow/acacia, oak.



COST PER TREE	
LAYOUT/TREE HOLE	$6.00
5 GAL TREE	6.00
PLANTING	3.50
STAKING	3.50
INITIAL WATERING	1.00
MAINT. DURING CONSTRUCT.	10.00
TOTAL	$30.00

NOTE: MAINTENANCE DURING CONSTRUCT.
ONE WATERING PER WEEK DURING
DRY SEASON USING TWO TRUCKa
DRIVERS & TWO LABORERS.

LANDSCAPE COST CRITERIA
LLAGAS CREEK

LANDSCAPE COST ESTIMATE

REACH 3 (19,200')	One 20 tree cluster per 250' reach plus One 20 tree cluster @ each road crossing (3) 1560 trees @ $30 per tree = $46,800.
REACH 5 (2,000')	One 20 tree cluster per 250' reach plus One 20 tree cluster @ each road crossing (1) 180 trees @ $30 per tree = $5,400.
REACH 9 (16,000')	One 15 tree cluster per 250' reach plus One 15 tree cluster @ each road crossing (3) 1010 trees @ $30 per tree = $30,300.
REACH 14 (18,000')	One 15 tree cluster per 250' reach plus One 15 tree cluster @ each road crossing 1140 trees @ $30 per tree = $34,200.
REACH 2 (11,000')	One 20 tree cluster per 300' reach plus One 20 tree cluster @ each road crossing (1) 760 trees @ $30 per tree = $22,800.
REACH 4 (11,000')	One 20 tree cluster per 200' reach plus One 20 tree cluster @ each road crossing (3) 1160 trees @ $30 per tree = $34,800.
REACH 6a (18,000')	One 20 tree cluster per 200' reach plus One 20 tree cluster @ each road crossing (6) 1020 trees @ $30 per tree = $ 30,600
REACH 6b (3,000')	One 15 tree cluster per 200' reach plus One 15 tree cluster @ each road crossing (0) 227 trees @ $30 per tree = $6,800
REACH 7a (7,000')	One 15 tree cluster per 300' reach plus One 15 tree cluster @ each road crossing (3) 520 trees @ $30 per tree = $15,600 .
REACH 7b (6600')	One 15 tree cluster per 300' reach plus One 15 tree cluster @ each road crossing (2) 480 trees @ $30 per tree = $14,400.

Page tot. $241,700

LANDSCAPE COST ESTIMATE

REACH 8a (5200')	One 15 tree cluster per 250' reach plus One 15 tree cluster @ each road crossing (4) 500 trees @ $30 per tree = $15,000.
REACH 8b (3200')	One 10 tree cluster per 300' reach plus One 10 tree cluster @ each road crossing (0) 220 trees @ $30 per tree = $6,600
REACH 10 (4000')	One 25 tree cluster per 250' reach plus One 15 tree cluster @ each road crossing (2) 270 trees @ $30 per tree = $8,100
REACH 11a (3600')	One 15 tree cluster per 250' reach plus One 15 tree cluster @ each road crossing (1) 227 trees @ $30 per tree = $6,800
REACH 11b (8000')	One 10 tree cluster per 300~~0~~' reach plus One 10 tree cluster @ each road crossing (1) 280 trees @ $30 per tree = $8,400
REACH 12 (6800')	One 10 tree cluster per 300' reach plus One 10 tree cluster @ each road crossing (2) 250 trees @ $30 per tree = $7,500
REACH 13 (3000')	One 10 tree cluster per 300' reach plus One 10 tree cluster @ each road crossing (1) 110 trees @ $30 per tree = $3,300
REACH 15a (3600')	One 15 tree cluster per 300' reach plus One 15 tree cluster @ each road crossing (1) 197 trees @ $30 per tree = $5,900
REACH 15b (8200')	One 10 tree cluster per 300' reach plus One 10 tree cluster @ each road crossing (4) 310 trees @ $30 per tree = $9,300
REACH 16 (4000')	One 10 tree cluster per 300' reach plus One 10 tree cluster @ each road crossing (2) 150 trees @ $30 per tree = $4,500

[illegible] $75,300

Landscaping total $317,100

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LLAGAS CREEK.
ADDITIONAL R/W FOR LANDSCAPING
AVERAGE 10' EACH SIDE OF CHANNEL

JOB No. 6209-1-1
SHEET No. 1 OF 1
DESIGNED BY K.H.
DATE DEC 10 '76
APPROVED

REACH No	LENGTH	AV. "W"	ACRES	REACH No.	LENGTH	AV. W.	ACRES.
2	11,800	20'	5.42	13S	3,400	20'	1.56
3	19,700		9.04	13N	1,600		0.73
4	11,915		5.47	14	18,695		8.58
5	2,385		1.10	15A	3,875		1.78
6A	18,170		8.34	15B	8,150		3.74
6B	3,130		1.44	16	4,035		1.85
7A	8,540		3.92				
7B	4,760		2.19	TOTAL ALL REACHES			77.35
8A	5,115		2.35				
8B	3,220		1.48				
9	16,900		7.76				
10	2,600		1.19				
11A	3,800		1.74				
11B	7,700		3.54				
12	9,000		4.13				

SECTION XV

SUPPLEMENTAL
COST BREAKDOWN
for
LOWER LLAGAS CREEK WATERSHED PROJECT

Calif
LL Hansen 3-5-79

Supplemental Cost Breakdown

SECTION XV Contents

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Lower Llagas Creek (0+00-64+00)	202
Fencing Cost Summary	203
Land Rights Footnote to table 2	204
Relocation Payments	205
Channel breakdown by type	207
Construction accomplished prior to this supplement	208

10-14-78
202

LLAGAS CREEK

STA 0+00 TO 64+00 (REACH 1)

CONSTRUCTION = $580,000 (Actual cost)

ENGINEERING (18.75%) = $110,000
OTHER INST. SERV. (6.25%) = 35,000

LAND RIGHTS
DMJM ESTIMATE, BASED ON DISCUSSIONS
W/ SANTA CLARA VALLEY WATER DISTRICT
IS $266,000 FOR BRIDGE AND ADJACENT
ROADWAY MODIF.

Calif.

LL Hansen 4-11-79

Summary of fencing
from Lower Llagas Channel Landrights Costs

Llagas Creek	Barbed Wire length		Unit Cost	Cost	
64+00 – 127+40	12,680		2.20	27,900	
127+40 – 182+00	10,920		2.20	24,000	
182+00 – 379+00	39,400		2.20	86,700	
379+00 – 458+00	15,800		2.20	34,800	
		78720			173,400
West Branch Llagas Creek					
0+00 – 169+00	33,800		2.20	74,400	
169+00 – 182+00	2,600		2.20	5,700	
182+00 – 220+00	7,600		2.20	16,700	
220+00 – 297+00	15,400		2.20	33,900	
		59400			130,700
Lions Creek					
182+00 – 195+00	2,600		2.20	5,700	
195+00 – 281+00	17,200		2.20	37,800	
281+00 – 285+00	800		2.20	1,800	
		20,600			45,300
Morey Channel					
211+00 – 227+00	3,200		2.20	7,100	
227+00 – 245+00	3,600		2.20	7,900	
		6800			15,000
North Morey Channel					
217+00 – 233+00	3,200		2.20	7,000	
		3200			7,000
		168,720			371,400

actual cost = $371,184 during rounding
cost became $371,400

WS
10-4-78

LOWER LLAGAS - LAND RIGHTS FOOTNOTE TO TABLE 2

REACH	BRIDGES	UTIL	FENCE	SURVEYS, LEGAL
1	188,600[1]	0	0	0
2	212,100	9,800	51,900	30,000
3	387,100	66,800	86,700	66,000
PART OF 4	108,000	6,400	34,800	60,000
9	119,600	28,800	74,400	115,000
10	333,300	800	11,400	25,000
11 A	150,500	800	16,700	30,000
11 B	64,500	0	33,900	42,000
12	98,300	800	39,600	40,000
13 S	64,500	0	15,000	15,000
13 N	0	0	7,000	6,000
	1,726,500	114,200	371,400	429,000

BRIDGES - 1,726,500 × 1.15[2] × 1.25[3] = $2,480,000

UTIL. MODIF. - 114,200 × 1.15 × 1.25 = 160,000

FENCING - 371,400 × 1.15 × 1.25 = 530,000

SURVEYS, ETC. - $430,000

---

[1] (7040 × 24.00) + 19,600 (FROM SHEETS 52, 58 & 59)

[2] CONTINGENCIES

[3] ENGINEERING

wa 1/2
10-3-78
205

LOWER LLAGAS - RELOCATION PAYMENTS

DMJM COST ESTIMATE INDICATES 9 DWELLINGS WILL HAVE TO BE ACQUIRED. THESE ARE TABULATED BELOW. (ON SHEET 2/2)

LETTER TO JOHN DALTON FROM DON LAWRIE, DEC. 6, 1971 GIVES AN ESTIMATE OF RELOCATION PAYMENT COSTS, AS FOLLOWS:

LOCATION	No. OF PARCELS	COST
CHESBRO RESERV.	8	$22,675
LLAGAS CREEK	3	125
WEST LITTLE LLAGAS	7	9,200

(THESE ARE ALL FOR THE UPPER LLAGAS WATERSHED)

THE CHESBRO RESERVOIR FIGURES REPRESENT THE COST OF RELOCATING 7 FAMILIES FROM DWELLINGS, AND ONE STORE. THE WEST LIT. LLAGAS FIGURE INCLUDES 2 FAMILIES (1 RENTER). THE REST OF THE RELOCATIONS INVOLVE VARIOUS OUTBUILDINGS.

ADVISORY SERVICES WERE ESTIMATED AT $300 PER ADVISEE.

WL
10-3-78 2/2

LOWER LLAGAS - RELOCATION PAYMENTS

REF. ENR COST INDICES

RISE FROM JULY 1971 TO JULY 1977 WAS ABOUT 70%.

AVG. COST OF A RELOCATION PAYMENT

22,675/8 = $2830

2830 × 1.7 = 4800

2830 × 1.8 = 5100 USE $5000

USE $500 PER PARCEL FOR ADVISORY SERV.

RELOCATION PAYMENT COST-SHARING, TAKEN FROM SUPPL. AGREEMENT NO. 1 (5-15-72) IS 66.2 % SCS AND 33.8 % SPONSORS.

REACH	NO. OF DWELLINGS	ESTIM. RELOC. PAYMENT	PL-566 FUNDS (66.2%)	OTHER FUNDS (33.8%)
LLAGAS 182+00 TO 379+00	1	$5000	$3,000	$2,000
LLAGAS 379+00 TO 458+00	3	15,000	10,000	5,000
WEST BRANCH 169+00 TO 182+00	1	5,000	3,000	2,000
W. BR. 182+00 TO 220+00	2	10,000	7,000	3,000
W. BR. 220+00 TO 297+00	2	10,000	7,000	3,000
	9	45,000	$30,000	$15,000

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Calif

LL Hansen 4-16-79

Previously Constructed

Lower Llagas Creek Watershed

From information supplied through the Area Office approximately 55% of the land treatment has been accomplished.

∴ Work done	PL 566	others	Total
land treatment	8,000	135,000	143,000
Channel 0+00 — 64+00	725,000	266,000	991,000
	733,000	401,000	1,134,000

SECTION XVI.

SUPPEMENTAL
COST BREAKDOWN
For
UPPER LLAGAS CREEK WATERSHED PROJECT

Calif
LL Hansen 3-5-79

Upper Llagas Creek WS

Supplementary Cost Breakdown item SECTION XVI Contents

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WR 1/
11-27-78
211

Upper Llagas Watershed
West Little Llagas Creek
Reach 8b

The original plan proposed a rectangular concrete section between West Dunne and Wright Avenues, approx. stations 144~ to 195~ (Reach 8a). This is through existing urban development, and the right-of-way cost for an unlined channel would be very high. The sponsors, in their resolution of 4-26-76, adopted a plan with the proposed concrete lining extended upstream along Hale Avenue to station 204+00. DMJM completed its cost estimates based on this proposal.

However, it appears that the lined channel is not the least costly alternative along Hale Avenue. The land may be expensive because it is road frontage, but it is still open land. The concrete lining will increase the construction cost by an estimated $80,000, and the right-of-way saved is only 1.3 acres. If the concrete channel is used, between $70,000 and $90,000 should be considered a non-project cost. The exact amount will depend on how installation services are handled in the allocation. (Installation services estimated as a percent of construction cost assume that those for the lined-channel alternative would be considerably higher than for an earth channel. This may not be the case here.)

I discussed this with John Richardson on November 9, 1978. He advised me that the sponsors would not be willing to bear the extra cost of a lined channel, and that the plan should be revised to show an earth channel upstream of Wright Avenue.

COMPUTATION SHEET
SCS–ENG–523 Rev. 8–69

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
GPO: 1972 —460-109

STATE CALIF		PROJECT UPPER LLAGAS WATERSHED		
BY WES	DATE 11-27-78	CHECKED BY	DATE	JOB NO. 213
SUBJECT WEST LITTLE LLAGAS (REACH 8b)				SHEET 3 OF

REVISE DMJM QUANTITIES TO PROVIDE FOR AN EARTH CHANNEL INSTEAD OF A CONCRETE ONE BETWEEN STATIONS 195+15 AND 204+00 (885 L.F.).

CONSTRUCTION:

DELETE - STRUCT. EXCAV. - 1377 C.Y.
RECT. CONC. CHAN. - 542 C.Y.
COMPACTED BACKFILL - 912.3 C.Y.

ADD - CHANNEL EXCAV. - 2557 C.Y. (FROM DMJM PHASE I COMPS.)
SEEDING - 885'×19.2'×2 = 0.78 AC.

QUANTITIES - STA 195+15 TO 227+35:

	DMJM	REVISED
CHANNEL EX.	14,389 C.Y.	16,946 C.Y.
COMP. EMB.	2689 C.Y.	2,689 C.Y.
DROP STRUCT. R/C	174.3 C.Y.	174.3 C.Y.
DRAIN INLETS	3 EA.	3 EA.
RIPRAP	147 C.Y.	147 C.Y.
FILTER	110 C.Y.	110 C.Y.
SEEDING	2.17 AC.	2.95 AC.
LANDSCAPING	$6,600	$6,600
STRUCT. EX.	1,377 C.Y.	0
RECT. CONC. CHAN.	542 C.Y.	0
COMP. BACKFILL	912.3 C.Y.	0

STATE CALIF		PROJECT UPPER LLAGAS WATERSHED		
BY WES	DATE 11-27-78	CHECKED BY	DATE	JOB NO. 214
SUBJECT WEST LITTLE LLAGAS (Reach 8b)				SHEET 4 OF

LAND RIGHTS

LAND PURCHASE

R/W WIDTH FOR EARTH = 100'
R/W WIDTH FOR R/C = 37'

DIFF. = 63'

ADD'L. R/W = 63'×885' = 1.28 AC.

FENCING
CHANGE 1770 L.F. OF CHAIN LINK TO BARBED WIRE

LAND RIGHTS QUANTITIES - STA 195+15 TO 227+35

	DMJM	REVISED
CHAIN LINK FENCE	1,770 L.F.	0
PRIVATE BRIDGES	480 S.F.	480 S.F.
RCB CULVERTS	57 C.Y.	57 C.Y.
BARBED WIRE FENCE	4,670 L.F.	6,440 L.F.
UTIL. MODIF.	$600	$600
LAND PURCHASE		
CREEK BOTTOM	0.46 AC.	0.46 AC.
LANDSCAPING ADD.	1.48 AC.	1.48 AC.
RESID./SCHOOL	5.65 AC.	6.93 AC.

COMPUTATION SHEET
SCS–ENG–523 Rev. 8–69

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
GPO: 1972 —459-109

STATE CALIF.	PROJECT UPPER LLAGAS		
BY WES	DATE 11-6-78	CHECKED BY	DATE
			JOB NO. 215
SUBJECT LAND RIGHTS FOOTNOTE FOR TABLE 2			SHEET OF

REACH	BRIDGES & CULV.	UTIL.	FENCE	SURVEYS & LEGAL
LLAGAS - 458+00 TO 498+15	108,000	500	17,700	20,000
498+15 TO 522+00	0	500	28,200	12,000
522+00 TO 582+00	0	1,500	26,400	60,000
582+00 TO 658+50	0	0	33,700	27,000
658+50 TO 687+00	0	4,500	12,500	18,000
687+00 TO 714+70	0	0	12,200	10,000
714+70 TO 743+00	0	0	13,800	21,000
W. LITTLE - 11+00 TO 86+40	36,500	0	33,200	59,000
86+40 TO 144+00	146,700	18,700	25,300	40,000
144+00 TO 195+15	49,900	33,600	40,900	16,000
195+15 TO 227+35	14,300	600	14,200	16,000
E. LITTLE 0+00 TO 183+00	148,800	5,500	82,300	108,000
183+00 TO 220+85	18,900	500	17,800	17,000
C & T 0+00 TO 45+20	19,700	400	17,100	20,000
45+20 TO 77+50	93,000	1,500	35,900	37,000
Σ ALONG CHANNELS	635,800	67,800	414,400	470,000
CHESBRO RESERV.	0	0	0	~~400,000~~ 36,000
	635,800	67,800	411,200	~~872,000~~ 506,000

ROAD RELOC. @ CHESBRO = $1,513,000 (1.10) = 1,664,000 ~~USE $1,510,000~~ ZZH 3-20-79

BRIDGES & CULVERTS - 635,800 × 1.15[1] × 1.25[2] = $910,000
UTILITY MODIF. - 67,800 × 1.15 × 1.25 = $100,000
FENCING - 411,200 × 1.15 × 1.25 = $600,000
SURVEYS, ETC. = $ ~~870,000~~ 510,000 ZZH 3-20-79

---

[1] CONTINGENCIES

[2] ENGINEERING

wd
11-5-78 1/4

UPPER LLAGAS - RELOCATION PAYMENTS

DMJM ESTIMATE SHOWS 4 DWELLINGS and 1 BUSINESS WILL BE REMOVED FOR THE CHANNEL WORK. THESE APPEAR TO BE LOCATED AS FOLLOWS:

LLAGAS CREEK STA 582+00 TO 658+50 - 1 BUSINESS
W. LITTLE LLAG. STA 86+40 TO 144+00 - 3 DWELLINGS
W. LITTLE LLAG. STA 144+00 TO 195+15 - 1 DWELLING

REF. - DEC. 1971 DRAFT SUPPL. BY J. DALTON:

IN ADDITION TO THE DWELLINGS & BUSINESS, PERSONAL PROPERTY WILL HAVE TO BE REMOVED FROM OUTBUILDINGS ON 3 PARCELS ON LLAGAS CREEK AND 4 PARCELS ON W. LITTLE LLAGAS. THE COST OF THESE IS MINIMAL (ESTIMATED AT ABOUT $40 EA. IN 1971. ADVISORY SERV. WAS ESTIMATED AT $300 EA.)

ALSO, 8 RELOCATIONS (7 FAMILIES AND 1 STORE) WILL BE REQ'D. @ CHESBRO RES.

Santa Clara Valley Water District

5750 ALMADEN EXPRESSWAY
SAN JOSE, CALIFORNIA 95118
TELEPHONE (408) 265-2600

January 31, 1979

Mr. Walt Sykes
Assistant Conservationist
Soil Conservation Service
2828 Chiles Road
Davis, California 95616

Dear Walt:

We have attempted to verify and clarify several issues relating to Chesbro Reservoir and future right of way acquisition, in response to your letter of January 10, 1979.

A field inspection of the area around Chesbro Reservoir has shown that there are approximately 27 structures which need to be acquired for the raising of Chesbro Dam and the relocation of Oak Glen Avenue. This figure confirms the October 1974 Real Estate Cost Estimate rather than the estimate made in 1971.

In 1974 the land required for raising Chesbro Dam and relocating Oak Glen Avenue was estimated to be 316 acres. We now find this value to be too large. Our recommendation now, is that all lands below the 550-foot contour plus a 100-foot horizontal setback be acquired for the dam raising project. This would necessitate acquisition of 220 acres of land. *

Our present estimate of right of way costs associated with the raising of Chesbro Dam is:

REAL ESTATE COST ESTIMATE TO RAISE
CHESBRO DAM AND RELOCATE ROAD

27	Buildings (and groups of buildings)	$ 810,000
20	Residences - relocation allowance	300,000
6	Tenant residences - relocation allowance	30,000
4	Farm - additional relocation allowance	40,000 Reloc
1	Commercial establishment - relocation allowance	10,000
220	Acres of land (varying $3,000-10,000 per acre)	1,430,000 R/W
	Total	$2,620,000

* This exceeds SCS minimum requirements. Thus $2,620,000 includes some non-project costs and some reloc. payments not eligible for cost sharing. We will show only project costs in the suppl. These are computed on the following pages. ws 3-21-79

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In May 1969, the Chesbro Reservoir capacity was recomputed by using the Conic method with the mapping done by Towill, Inc. in 1968. This capacity was found to be 8,086 acre-feet at spillway elevation of 525.0 feet. This differed from the capacity prepared by the Soil Conservation Service in November 1965. I have attached a summary table comparing the old and new values. I have also enclosed a tabulation of Area-Capacity-Elevation values for the new computations. All future references or studies of Chesbro Reservoir should use these values.

Sincerely yours,

John L. Richardson

John L. Richardson
Head, Project Development Branch
Design and Construction

Enclosures

Calif

Upper Llagas

LL Hansen 3-2-79

Chesbro Dam State Filing Fees

Based on Construction Cost = $4,750,000

1st $100 000 @.03 = 3000
400,000 @ .015 = 6000
500,000 @ .01 = 5000
3,750,000 @ .004 = 15000

$29,000

Calif   Upper Llagas Creek W/S

LL Hansen 3-13-79

Chesbro Dam Land Rights

The following is the rationale used in arriving at the ESTIMATES for the Land Rights

From WPH

1. The area of the permanent pool must be owned by the local entity
2. The area above permanent pool and the emergency spillway hydrograph must be covered by flowage easements

The work plan calls for the crest of the primary spillway to be at elevation 525'. This is the elevation of the existing emergency spillway. Therefore the elevation of the permanent pool does not change.

In checking the hydrology and spillway hydraulics it was confirmed that the elevation of the emergency spillway hydrograph would be contained within the primary spillway. The crest of the emergency spillway was taken as the limit of the required flowage easements. This elevation is 537 feet.

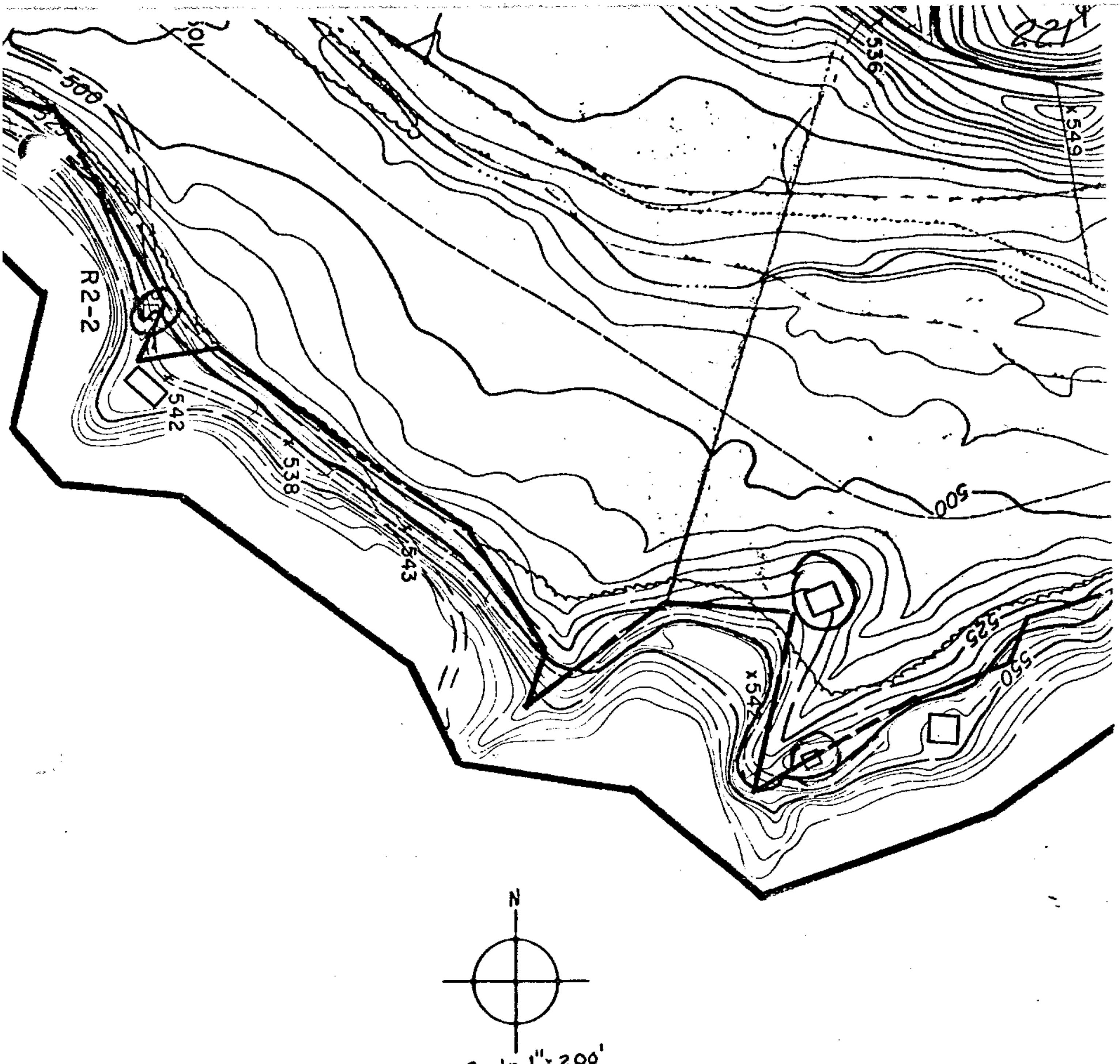
The 537 contour was superimposed on the ownership map supplied by the Sponsor. Within this contour Three (3) structures were located. In addition five (5) structures were located so close that it seemed prudent to allow funds for the possibility of their purchase. Therefore a total of eight structures appear to be involved.

In the letter of 1,31,1979 from SCVWD, the 27 structures appear to be contained in the proposed 100 ft set back. This set back does not apply in as much as this multiple purpose dam does not have recreation as its purpose.

From the spillway stage-area curve

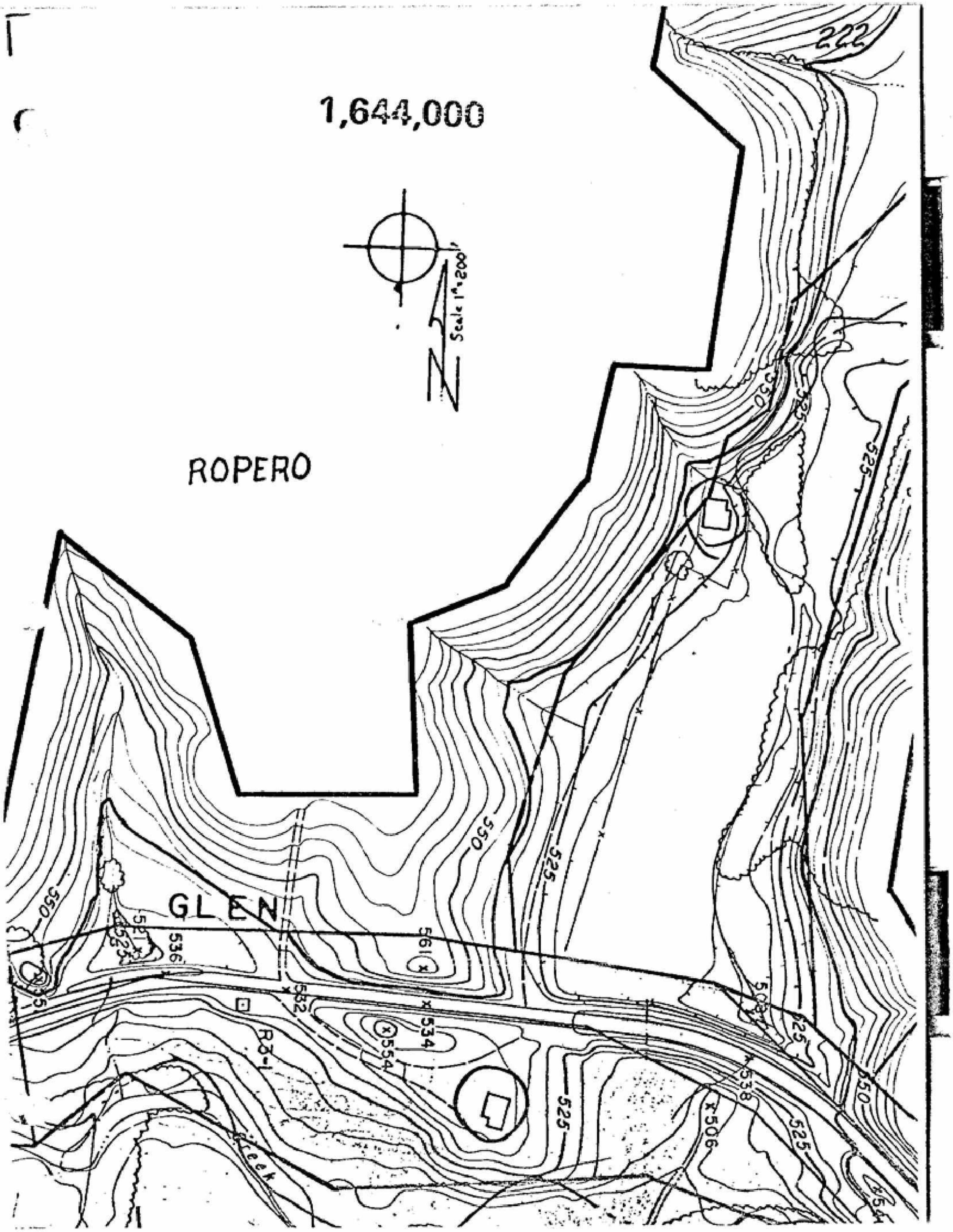
Elev	area
525	270 ac
537	343 ac
Δ area	73 ac

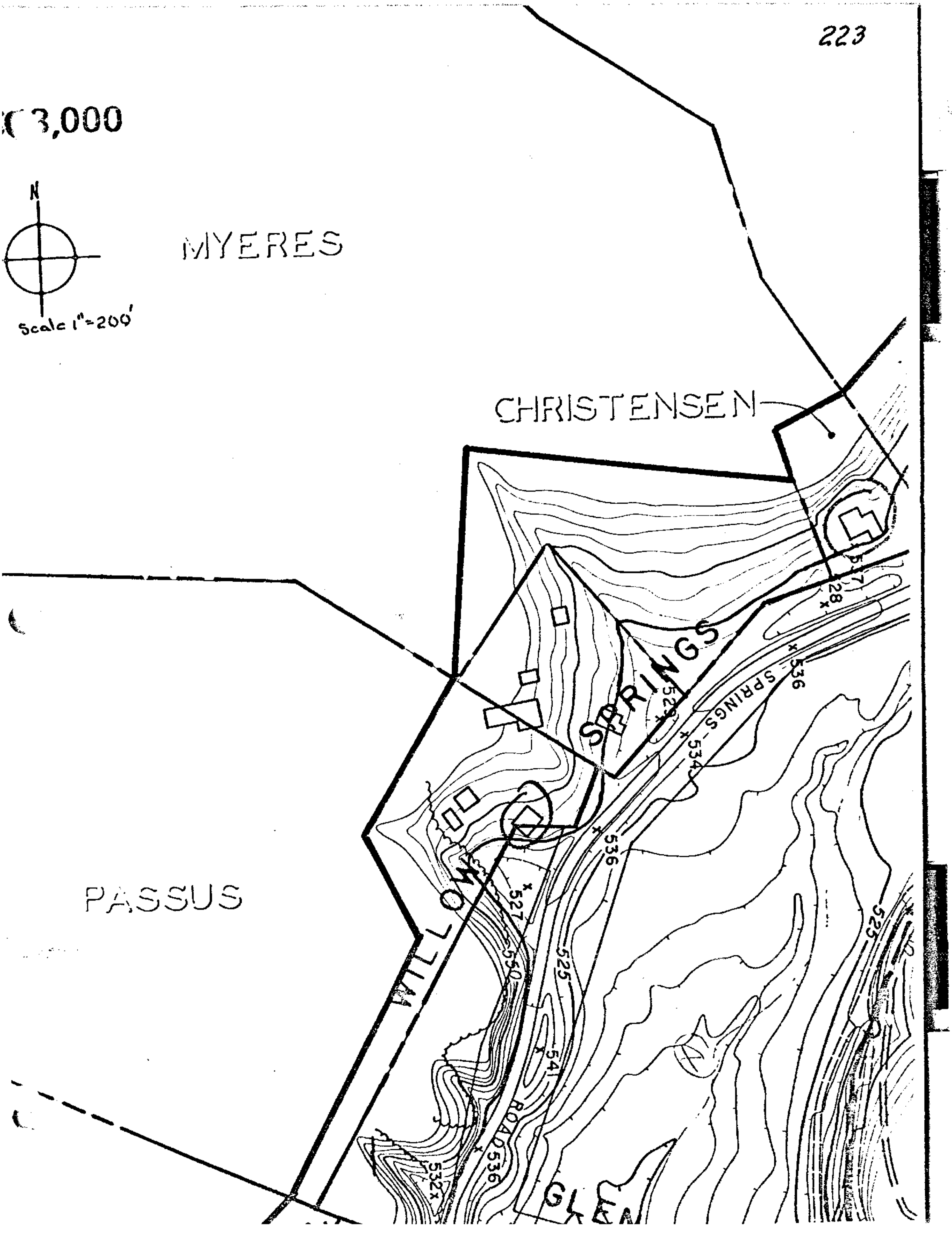
} ESTIMATED AREA



1,646,000

JORGENSEN


1,644,000
Scale 1"=200'
N
ROPERO
GLEN
222
550
550
550
550
525
525
525
525
525
525
525
561
536
532
534
554
527
523
538
506
508
R3-1
Creek
554


3,000
N
Scale 1"=200'
MYERES
CHRISTENSEN
PASSUS
SPRINGS
SPRINGS
WILLOW
ROAD
GLEN
527
528
529
536
534
536
527
550
525
541
536
532
525

Calif Upper Llagas Creek WS

LL Hansen 3-13-79

Chesbro Dam Land Rights Costs

1/	Road Relocation	1,513,000(110)	= 1,664,000
2/	73 acres	@$6500/ac	= 474,500
2/	8 Buildings	@$30,000ea	= 240,000
3/	Surveys & Legal (15%)		= 36,000
			$2,414,500
		Use	2,415,000

1/ 1973 calculation increased by 10% to 1977 value

2/ Unit cost based on 1-31-79 SCVWD letter

3/ 15% of building cost

Calif

Upper Llagas Creek WS

LL Hansen 3-13-79

Relocation Payments & Relocation Assistance Advisory Service

Item	Costs Relocation		Adisory	
Llagas Creek				
1 dwelling	5000	~~5300~~ 5000	500	2,000
3 out buildings	300		1500	
West Little Llagas				
4 dwellings	20,000	~~20,400~~ 21,000	2000	4,000
4 out buildings	400		2000	
Chesbro Dam				
7 Resisdence	35000	45,000	3500	4,000
1 Commercial	10 000		500	
		$71,000		$10,000

Use same cost as Lower Llagas

Relocation

$5000	each	dwelling
10000	each	business
500	each	advisory service
100	each	outbuilding

Calif Upper Llagas Creek WS

L L Hansen 3-13-79

Relocation Cost Sharing

Cost Sharing (Based on Total Project Cost From Table 1)

Item	Cost (dollars) PL 566	Other
Land Treatment	180,000	650,000
Construction	10,380,000	-0-
1/ Installation	2,800,000	-0-
Land Rights	-0-	7,277,000
Relocation Advisory	-0-	10,000
Dam Filing Fee		29,000
	13,360,000	7,966.000
Share (%)	62.6	37.4

$\Sigma = 13{,}360{,}000 + 7{,}966{,}000 = 21{,}326{,}000$

1/ Engineering + other

Calif
L L Hansen 3-13-79
Relocation Payments

Upper Llagas Creek WS

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See Previous Page for breakdown of Est. Relocation Payment

		Estimated Cost	
Item	Relocation Payment	PL 566 62.6%	other 37.4%
Chesbro Dam	45,000	28,000	17,000
Llagas Creek	5,000	3,000	2,000
West Little Llagas Cr.	21,000	13,000	8,000
	71,000	44,000	27,000

10-3-78

TO HINK

Warren,

We are finishing up the work plan supplements for Lower and Upper Llagas Creek. The cost estimates were prepared by an A&E firm (DMJM) in January, 1977. DMJM also made an environmental assessment. You guys reviewed a draft of the whole shebang in August 1976.

I have attached the unit prices from DMJM's January 1977 report.

Question(s) are these still good?
which ones should be changed?
What should they be changed to?

Walt S.

Ref. - conversation w/ Hink. Compared w/ Revolon & Beardsley the DMJM prices look adequate for 1977. (Compared it w/ Apr. 78 Revolon) No. Calif ought to be higher. Might put on a blanket 10% rise when the final thing is put together after EIS review. WS 10-3-78

TABLE 6

UNIT COSTS FOR CHANNEL IMPROVEMENTS AND LAND ACQUISITION

Item	(1975 Dollars) Unit Cost
CHANNEL COSTS	
Channel Excavation	1.65 C.Y.
Compacted Embankment (Channels)	0.50 C.Y.
Drop Structures	200.00 C.Y.
Drainage Inlets	3,000.00 Ea.
Riprap	20.00 C.Y.
Filter Stone	15.00 C.Y.
Seeding	650.00 Ac.
Landscaping	L.S.
Structural Excavation	3.00 C.Y.
Rect. Concrete Channel	126.00 C.Y.
Compacted Backfill	5.00 C.Y.
Levee Embankment	1.25 C.Y.
Site Preparation (Levees)	3.00 L.F.

Item	(1975 Dollars) Unit Cost
OTHER CONSTRUCTION COSTS	
State and County Bridges	24.00 S.F.
Private Bridges	12.50 S.F.
RCB Culverts	145.00 C.Y.
Relocation of Utilities	L.S.
Railroad Bridge	300.00 L.F.
LAND PURCHASE	
Creek Bottom	100.00 Ac.
Agricultural	3,500.00 Ac.
Residential (Low Value)	8,000.00 Ac.
Residential (Medium Value)	10,000.00 Ac.
Residential (High Value)	13,000.00 Ac.
School	13,000.00 Ac.
Industrial	20,000.00 Ac.
Dwellings	25,000.00 Ea.

Calif

LL Hansen 4-16-79

Work accomplished prior to this supplement

As per information supplied through the Area Office approximately 63% of the land treatment has been accomplished.

Land Treatment

SCS	25,000	277,000	302,000
Forest Service	126,000[1]	189,000	315,000
	151,000	466,000	617,000

---

[1] 90% Completed

XVII

SECTION XII

SUPPLEMENTAL
DESIGN
for
LOWER LLAGAS CREEK WATERSHED PROJECT

SECTION XII Contents

Item	Page
Design check Llagas Creek between station 0+00 and 64+00	233
Channel breakdown by Type	238a

CALIF. LOWER LLAGAS CREEK W/S

WES 10-3-77

LLAGAS CREEK BELOW STA 64+00: 1

DATA FOR TABLE 3A

THIS REACH HAS ALREADY BEEN BUILT. ATTEMPTS TO LOCATE THE FINAL DESIGN COMPUTATIONS HAVE BEEN UNSUCCESSFUL. THEREFORE, THE DEPTH AND VELOCITY FIGURES FOR TABLE 3A ARE RECONSTRUCTED HEREIN, USING TWO SOURCES OF INFORMATION:

1. 1973 CONTRACT PLANS, INV. NO. SCS-2-CF-73.

   THIS GIVES THE CHANNEL CROSS-SECTIONS, GRADIENTS, AND THE DESIGN WATER SURFACE PROFILE WITH BACKWATER FROM THE PAJARO RIVER.

2. "A REPORT ON THE DESIGN OF LLAGAS CREEK FROM THE PAJARO RIVER CONFLUENCE TO THE WEST BRANCH LLAGAS CREEK CONFLUENCE"

   (UNDATED, BUT DONE BY THE SANTA CLARA CO. FC & WD UNDER AN ENGR. SERVICES AGMT. OF FEB. 1, 1971)

   PAGE 8 SAYS AN n-VALUE OF 0.030 WAS USED FOR DEPTH DESIGN AND A VALUE OF 0.024 FOR VELOCITY DESIGN.

DESIGN DISCHARGES WERE TAKEN FROM THE ORIGINAL WORK PLAN.

THE DEPTH AND VELOCITY FIGURES FOR TABLE 3A ARE ON SHEETS 6 (DEPTH AND AGED-CHANNEL VELOCITY) AND 5 (AS-BUILT VELOCITY BELOW 47+50)

(AS-BUILT VELO. ABOVE 47+50 CANNOT BE DETERMINED WITHOUT MORE DETAILS ABOUT THE BLOOMFIELD BRIDGE. THE CHANNEL WILL BE AGED BEFORE THE BRIDGE IS REPLACED.)

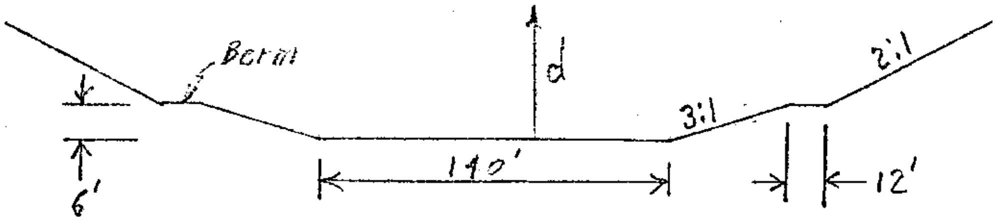
CALIF
WES 10-3-77

LOWER LLAGAS CREEK

LLAGAS CR.- BELOW STA 64+00

2

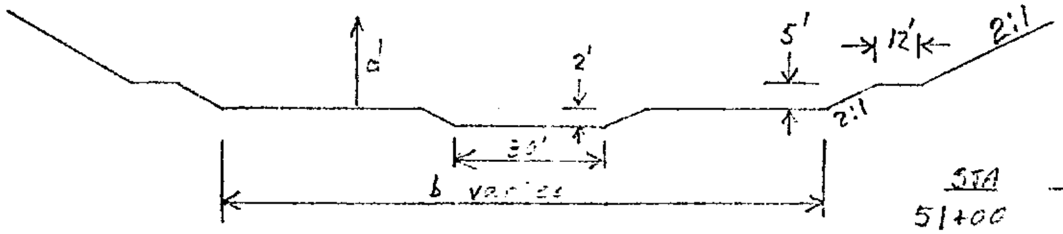
TYPICAL SECTION STA 0+00 TO 47+50
(FROM CONTRACT DRAWINGS, SHEET 3)



$S_0 = 0.001$

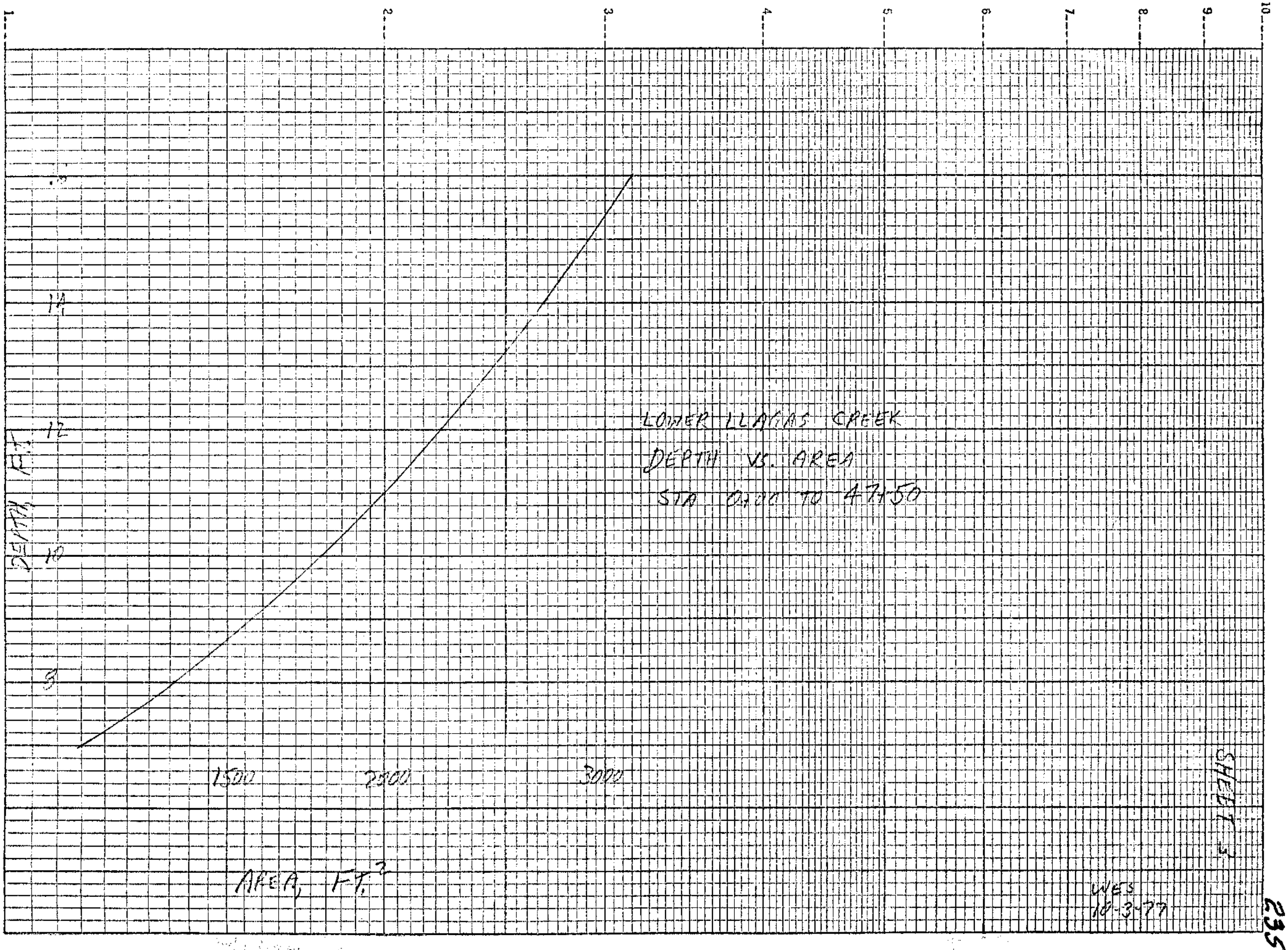
d	A	P	R	$1.486\,AR^{2/3}$ $\left(= \frac{nQ}{S^{1/2}}\right)$
3	447	159	2.81	1323
6	948	178	5.33	4296
6.1	968	202	4.79	4089
6.5	1048	204	5.14	4637
7	1150	206	5.58	5375
8	1356	211	6.43	6965
10	1780	220	8.09	10,660
12	2220	229	9.69	14,399
14	2676	238	11.24	19,958
16	3148	247	12.74	25,524

TYPICAL SECTION - STA. 51+00 TO 61+85
(FROM SHEET 6 OF CONTRACT DWGS.)



STA	b
51+00	110'
61+85	121'

K+E SEMI-LOGARITHMIC 359-51
KEUFFEL & ESSER CO. MADE IN U.S.A.
1 CYCLE X 70 DIVISIONS

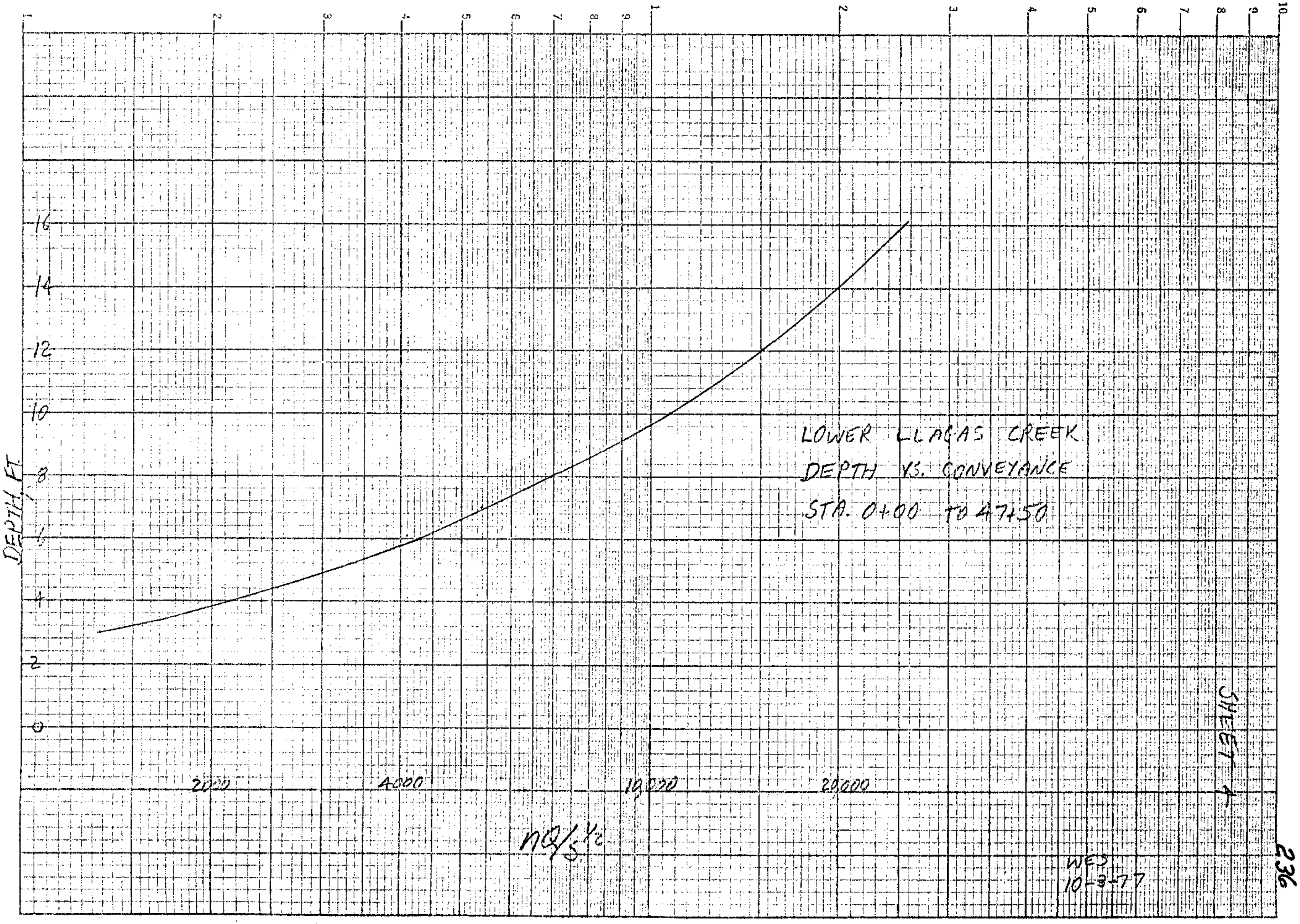


LOWER LLAGAS CREEK
DEPTH VS. AREA
STA 0+00 TO 47+50

SHEET 3

WES
10-3-77

K&E SEMI-LOGARITHMIC 359-61
KEUFFEL & ESSER CO. MADE IN U.S.A.
2 CYCLES × 70 DIVISIONS



LOWER LLAGAS CREEK
DEPTH VS. CONVEYANCE
STA. 0+00 TO 47+50

SHEET 4

WES
10-3-77

CALIF. LOWER LLAGAS CREEK W/S

WES 10-3-77

LLAGAS CREEK BELOW STA 64+00 5

STA 0+00 TO 30+00 DESIGN Q = 10,000 CFS (10% CHANCE)

30+00 TO 47+50 Q = 14,300 (4% CHANCE)

47+50 TO 64+00 Q = 13,900 (2% CHANCE)

NORMAL DEPTHS AND VELOCITIES

$S_0 = 0.001$

$n = 0.030 \Rightarrow n/S_0^{1/2} = 0.949$

$n = 0.024 \Rightarrow n/S_0^{1/2} = 0.759$

d_n AND A_n READ FROM GRAPHS

	n = 0.030				n = 0.024			
Q	$nQ/S_0^{1/2}$	d_n	A_n	V_n	$nQ/S_0^{1/2}$	d_n	A_n	V_n
10,000	9,490	9.4	1650	6.1	7590	8.4	1450	6.9
14,300	13,570	11.4	2090	6.8				

CALIF. LOWER LLAGAS CREEK W/S
WES 10-3-77
LLAGAS CR. BELOW STA 64+00 6

PROFILE DATA FROM CONTRACT DWGS., SHEETS 8 & 9

STA	INV. ELEV.	DESIGN W.S. ELEV.	DEPTH
0+00	130.0	143	13'
14+00	131.4	143.4	12'
28+00	132.8	143.8	11'
30+00	133.0	146.9	13.9
42+00	134.2	147.4	13.2
47+00	134.7	147.6	12.9
51+00	135.1	149.3	14.2
56+00	135.6	149.6	14.0
62+00	136.2	150.0	13.8
64+00	136.4	150.1	13.7

(BASED ON BACKWATER FROM PAJARO RIVER)

VELOCITIES

STA	Q	d	AREA (From Curve)	Velo.
0+00	10,000	13	2440	4.1 FT./SEC.
28+00	10,000	11	2000	5.0
30+00	14,300	13.9	2660	5.4
47+00	14,300	12.9	2420	5.9

STA 51+00

$b = 110'$ $d = 14.2'$ $Q = 13{,}900$ cfs

NEGLECTING PILOT CHANNEL, $A = (5)(120) + (9.2)(148.4) = 1965$ FT.^{2}

$V = 7.1$ FT./SEC.

STA 62+00

$b = 121$ $d = 13.8$ $6 = 13{,}900$

NEGLECTING PILOT CHANNEL, $A = (5)(131) + (8.8)(158.6) = 2051$

$V = 6.8$ FT./SEC.

10-14-78

LOWER LLAGAS – MILES OF CHANNEL BY TYPE

(M)

LLAGAS	0+00 TO 127+40	12,740
	182+00 TO 379+00	19,700
WEST BR.	0+00 TO 169+00	16,900
MOREY	227+00 TO 245+00	1,800
		51,140 L.F. = 9.7 mi.

(N)

LLAGAS	127+40 TO 182+00	5,460
	379+00 TO 458+00	7,900
WEST BR.	182+00 TO 297+00	11,500
LIONS	281+00 TO 285+00	400
		25,260 L.F. = 4.8 mi.

(O)

WEST BR.	169+00 TO 182+00	1,300
LIONS	182+00 TO 281+00	9,900
MOREY	211+00 TO 227+00	1,600
N. MOREY	217+00 TO 233+00	1,600
		14,400 L.F. = 2.7 mi.

17.2

XVIII
SECTION XIII

SUPPLEMENTAL
DESIGN
for
UPPER LLAGAS CREEK WATERSHED PROJECT

Calif Upper Llagas Creek WS

L L Hansen 3-5-79

Supplementary Design

SECTION XIII Contents

Item	Sheet
Telephone notes	241
TSC Chesbro Design	242
Chesbro Design + Calculations	247
Tennant & Corrallitos Cr. @ Columbet Ave	255
Leveed Flood Plain	271
Allowable Velocity Check	283
Channel Breakdown by Type	292a

Telephone Conversation on 2/20/79 between Sykes, Sterns
Curtess & Hansen
Notes by Hansen

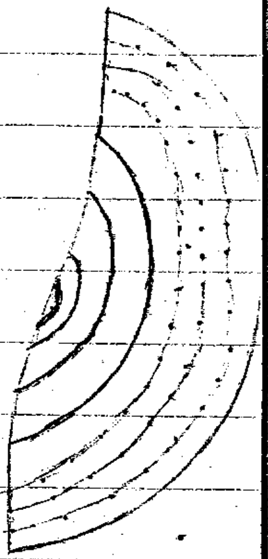
If dam essential

more serious

Updating probably can't say what % to add to cost estimate
no change in scope no additional purpose
don't go to Congress

Earthquake

1. Prudent to check now rather than in design



2. Take down and ~~redesign~~ rebuild
Talbot ~~in~~ old dam in new dam
Profile throu dam (Eng. 74)
Sept 18-73
Rolston to Evans

2-21-79
Hansen & Sterns Telephone conversation
Sterns — 423-2357
Talbot profile not available in Davis, Sterns to send copy

242

West Regional Technical Service Center, Portland, Oregon 97209

ENG - Upper Llagas Watershed, California
Chesbro Dam Enlargement, Preliminary Design
and Cost Estimate

Sept. 13, 1973

W. F. Evans, State Conservation Engineer,
SCS, Davis, California

We have completed the preliminary design and cost estimate on the subject project. Rough cost estimates of two different spillway systems are attached.

The preliminary design on the conduit modification was completed in April and was sent to the Washington Engineering Division for review. A copy of this design was sent to H. T. Shogren at that time. A stability analysis was made using static forces with a seismic coefficient of 0.25 times gravity. Shear parameters for this analysis were assumed to be the same as those used in the original design completed by the consultant in 1954. The slopes and embankment configuration shown on the conduit modification represent the approximate cross section that is necessary for a safe design on this basis. Shear parameters of both the existing embankment materials and the proposed fill materials will be necessary before final design.

Some difficulty was encountered in verifying the hydrologic parameters to be used for design flood routing and spillway proportioning. The EWP Unit hydrologists worked with your people to establish this. The values used are as follows:

CN = 68
T_c = 3.07 hour
D.A. = 19.2 square miles

Several durations and rainfall intensities were routed using information from Hydrometeorological Report 36. The 6 (ES-1020), 24, 48, and 72 hour general PMP storms were routed. The longer duration storm (24, 48 and 72 hour) had a pronounced effect on the routing characteristics of the reservoir and spillway system. This is due to the high intensity characteristics of the long duration storms in this area and the inability of the small reservoir to store any appreciable volume of the runoff.

Since a side inlet type spillway was already designed that would pass the 6 hour ES-1020 storm, a rough preliminary cost estimate was completed for this spillway. It was our understanding that the top of the dam could not be raised above elevation 546 because of right-of-way problems with the road relocation. This will require a chute spillway

W. R. Evans
9/13/73

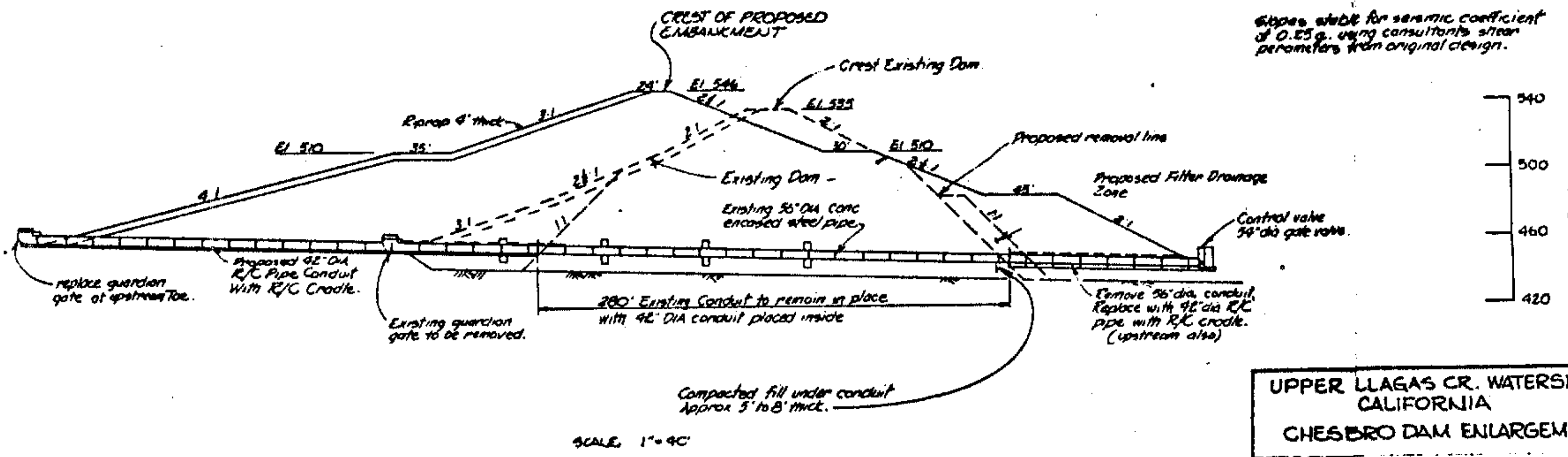
approximately 120 to 150 feet wide to pass the longer duration general storms. The rough preliminary cost estimate for the total project with a 120 foot wide chute spillway, not including the road relocation, is $1,700,000. The complete estimate is attached. Many quantities were roughly computed based on assumed wall thicknesses and other dimensions.

If you decide to continue on with a detailed investigation for design, we will be happy to assist you in determining the information needed.

David C. Ralston
Head, Design Section

Attachments - 2

cc: (w/attach.)
J. C. Dalton, Project Engineer,
SCS, Morgan Hill, California
C. F. Stearns, Geologist,
SCS, Davis, California


CREST OF PROPOSED EMBANKMENT
Crest Existing Dam
Slopes stable for seismic coefficient of 0.25 g. using consultants shear parameters from original design.
24'
El 546
2:1
El 535
2:1
Riprap 4' thick
3:1
El 510
35'
30'
El 510
2:1
Proposed removal line
Existing Dam -
3:1
2½:1
1:1
3:1
4:1
Proposed Filter Drainage Zone
45'
2:1
1:1
Existing 56" DIA Conc encased steel pipe
Control valve 54" dia gate valve.
replace guardian gate at upstream Toe.
Proposed 42" DIA R/C Pipe Conduit With R/C Cradle.
Existing guardian gate to be removed.
280' Existing Conduit to remain in place with 42" DIA conduit placed inside
Remove 56" dia. conduit, Replace with 42" dia R/C pipe with R/C cradle. (upstream also)
Compacted fill under conduit Approx 5' to 8' thick.
540
500
460
420
Elev
SCALE 1" = 40'

UPPER LLAGAS CR. WATERSHED
CALIFORNIA

CHESBRO DAM ENLARGEMENT

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

JRT 4-73
JRT 4-73
JDL 2-79

PRELIMINARY, MUST BE
REANALYZED BEFORE
FINAL DESIGN

COMPUTATION SHEET
SCS-ENG-523 Rev. 8-69

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
GPO: 1972—469-109

STATE Calif	PROJECT Upper Llagas - Chesbro Dam	
BY JRT	DATE 9-73	CHECKED BY	DATE	JOB NO. 245
SUBJECT Cost Estimate (Rough Preliminary)		SHEET 1 OF 1

With side inlet spillway - 6 hr. ES-1020 storm.

Item Description	Unit	Quantity	Unit Price	Extension
Diversion of Streamflow & Dewater	Job	1	20,000	20,000
Clearing & Grubbing	Job	1	2,000	2,000
Abutment Excavation (for Spillway)	C.Y.	1,700	1.00	1,700
Embankment Excavation (for conduit)	C.Y.	110,000	0.50	55,000
Earthfill - Embankment	C.Y.	377,000	0.75	283,000
Drainfill - Embankment	C.Y.	6,000	10.00	60,000
Rock Riprap - Emb. Facing	C.Y.	16,000	10.00	160,000
Structure Backfill	C.Y.	2,000	2.00	4,000
Reinforced Concrete Emergency Spillway - Inc. Reinf. Steel	C.Y.	2,000	150.00	300,000
Reinf. Concrete cradles & Collars	C.Y.	160	150.00	24,000
Reinforcing Steel	lbs	280,000	0.25	70,000
R/C Pressure Pipe. 42" dia.	Lin ft.	700	110.00	77,000
Cement Grout - Between existing and new conduit (Mat. & Placing)	gal	10,500	1.00	10,500
Dismantle existing values & Install @ new location.	Ea	3	2,000	6,000
Drain Pipe.	Lin. Ft.	400	4.00	1,600
Misc. - Metalwork - Piezometers - Monuments etc	Job	1	10,000	10,000
sub. Total				1,084,800
≈ 10% contingency				115,200
Total				$ 1,200 000

COMPUTATION SHEET

SCS–ENG–523 Rev. 8–69

U. S. DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE

GPO: 1972 —460-109

STATE Calif.

PROJECT Upper Llagas - Chesbro Dam

BY JRT

DATE 9·73

CHECKED BY

DATE

JOB NO. 246

SUBJECT Cost Estimate. (Rough Preliminary)

SHEET 1 OF 1

With Box inlet Spillway - 72 hr General Storm

Item Description	Unit	Quantity	Unit Price	Extension
Diversion of streamflow & Dewater	Job.	1	20,000	20,000
Clearing & Grubbing	Job	1	2,000	2,000
Abutment excavation (for spillway)	C.Y.	12,000	1.00	12,000
Embankment Excavation (for conduit)	C.Y.	110,000	0.50	55,000
Earthfill - Embankment	C.Y.	377,000	0.75	283,000
Drainfill - Embankment	C.Y.	6,000	10.00	60,000
Rock Riprap - Emb. facing	C.Y.	16,000	10.00	160,000
Structure Backfill	C.Y.	2,500	2.00	5,000
Reinforced Concrete Emergency Spillway - Including Reinf. Steel	C.Y.	4,500	150.00	675,000
Reinf. Concrete Cradle & Collars	C.Y.	160	150.00	24,000
Reinforcing Steel	lbs.	600,000	0.25	150,000
R/C Pressure Pipe - 42" dia	Lin Ft.	700	110.00	77,000
Cement Grout - between existing & new conduit (materials & placing)	gal	10,500	1.00	10,500
Dismantle existing valves and install at new location	Ea	3	2,000	6,000
Drain Pipe -	Lin Ft.	400	4.00	1,600
Misc - Metalwork, Piezometers Monuments & etc -	Job.	1	10,000	10,000
Sub total				1,551,100
≈10% Contingency				148 900
Total				1,700,000

Calif
L. L. Hansen 2-21-79
Chesbro Dam

Upper Llagas WS

Original Fill Volumes

Map Scale 1" = 89' 1 □" = 7921 □'

Planemeter Factor .025

Elev	Area □"	Area □'	Ave Area □'	height	Volume (yds)
535	1.28	10,139			
			25862	10	9579
525	5.25	41,585			
			69507	25	64,358
500	12.30	97,428			
			127,924	25	118,448
475	20.00	158,420			
			160,321	5	29,689
470	20.48	162,222			
			103,805	20	76,892
450	5.73	45,387			
			33,189	5	6,146
445	2.65	20,991			
					305,112 cy

7.95

10%

Cut off trench

$b = 23'$
$d = 5'$ average
$\ell = 845$ use $850'$
S:S = 1:1 assumed
$\text{Area} = bd + zd^2 = 23(5) + 1(5)^2 = 140\ ft^3/ft = 5.2$ use $6\ yd^3/ft$
$\text{Vol} = 850(6) = \underline{\underline{5100}}\ yd^3$

Drain

$b = 12'$
S:S = 1.5:1
$d = 4.5$ average
$\ell = 849$ use 850 ft

$$\text{Vol} = \frac{A\ell}{27} = \frac{bd + zd^2(\ell)}{27} = \frac{4.5(12) + 1.5(4.5)^2(850)}{27} = 958 \text{ use } 1000\ yd^3$$

Calif
LL Hansen 2-21-79

Upper Hagas WS

Chesbro Dam Original Volumes

2

Foundation
depth 12 ft average
$\text{Area} = 30.65^{\square''} = 242{,}779^{\square'}$

$$\text{Vol} = \frac{12(242{,}779)}{27} = \underline{\underline{107{,}902 \text{ yd}^3}}$$

Σ Vol

Fill = 305,100 cy
Cutoff = 5,100
Drain = 1,000
Foundation = 107,900
419,100 cy

In analysing the existing dam and its size increases for flood control capacity and seismic effects the following approach was used. At this time a complete analysis of the existing dam should be made and a complete design of the required dam should be made. However neither the time nor the budget is available. By telephone with TSC, Sterns & Curtess, on 2/20/79, it was agreed to include sufficient funds in the WorkPlan estimate to remove the existing dam and construct a new dam. TSC is to supply us with a copy of a design profile established by J.R. Talbot in 1923. It was agreed by Sykes & TSC that this approach would in all likelihood cover the cost of modifying the existing structure.

Calif
LL Hansen
Chestro Dam Cost Estimate

Upper Llagas WS

249

Remove & Stockpile Existing Dam fill 420,000 yd^3 @ \$1.00	=	\$420,000

Calif Upper Llagas WS

L L Hansen 2-21-79

Chesbro Dam New Construction

The following calculations are made on the assumption that the original fill has been totally removed except for the foundation cut off curtain and toe drain on the downstream portion of the fill.

∴ 1. Calculate new fill required
2. Calculate volume of Chimney drain
3. Calculate volume of additional toe drain required.

Solution

1. New fill

Without redrawing the proposed enlarged dam on the original topog. map, use volume from 9/18/73 letter and add existing fill volume.

∴ Vol = 377000 + 305,000 = 682,000 cy.

Location of borrow	305 000	in stockpile
	377 000	in borrow area

2. Chimney drain

Width	use 12' for equipment width
height	carry drain to height of emergency spillway because of seismic criteria Elev 525

From cross section (see flow page for drawing) it is apparent that some of the new fill will be required on the downstream face and it is assumed that this will be done

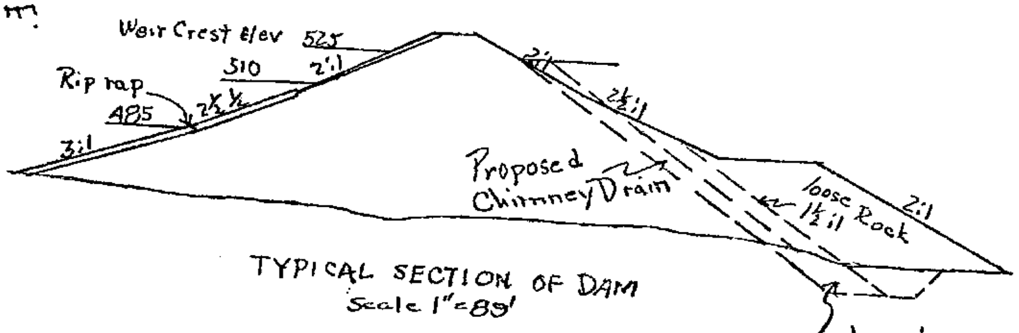
Side slope = 1½ : 1
slope length factor = 1.803

Calif

L L Hansen 2/22/79

Chesbro Dam

Upper Llagas Creek Watershed



extend Toe drain to intercept Chimney Drain

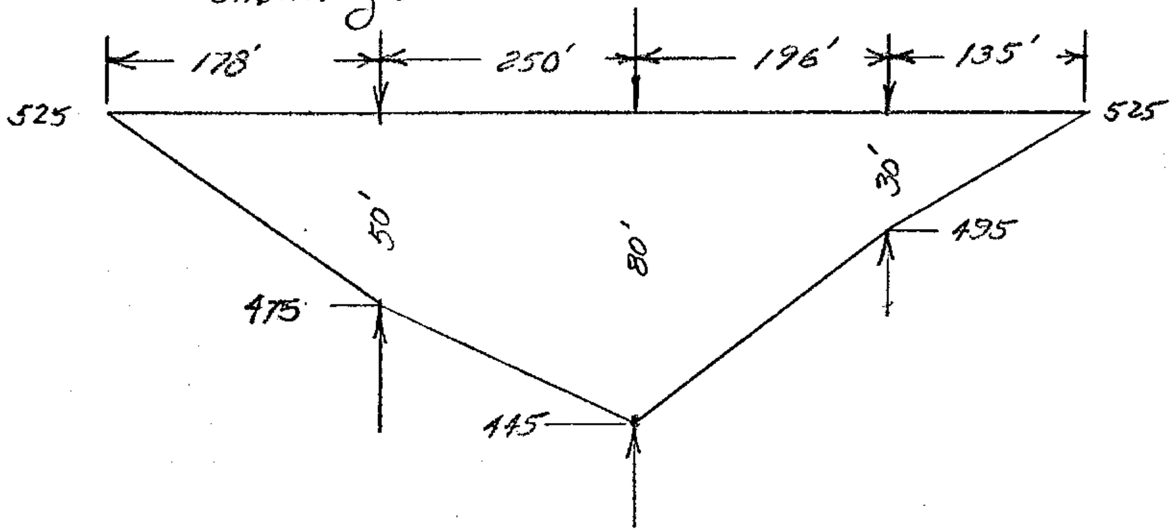
TYPICAL SECTION OF DAM
Scale 1"=89'

Traced from Original Plan in Work Plan

Calif
L L Hansen 2/22/79
Chesbro Dam

Upper Llagas WS

Chimney Drain



Chimney Drain Transformed Section

Elev	height	Slope factor	(Adj Slope length)	(Ave Adj Slope length)	Length	Width	Vol (yd^3)
525	0	1,803	0				
				45.1	178	12	3568
475	50	1,803	90.2				
				117.2	250	12	13022
445	80	1,803	144.2				
				99.2	196	12	8641
495	30	1,803	54.1				
				27.1	135	12	1626
425	0	1,803	0				
							26857 yd^3

Calif Upper Llagas WS

L L Hansen 2/22/79

Chesbro Dam Cost estimate

This cost estimate is based on the previous calculations and volumes derived in 1973 by J. Talbot for 72 hr Storm with prices updated.

Item Description	Unit	Quantity	Unit Price	Amount
Water Control & Dewater	Job	1	33000	33,300
Clearing & Grubbing	Job	1	3000	3,300
Abutment Excavation (Spillway)	cy	12,000	1.60	19,200
Embankment Excavation (Conduit)	cy	110,000	1.00	110,000
Earth Embankment				
Remove & Stockpile	cy	305,000	1.00	305,000
Replace stockpiled in fill	cy	305,000	2.00	610,000
Extension	cy	377,000	2.00	754,000
Drain fill				
Toe drain collector	cy	6,000	10.00	60,000
Chimney drain	cy	27,000	12.50	337,500
Rock Riprap - Emb. facing	cy	16,000	20.00	320,000
Structural backfill	cy	2,500	3.00	7,500
Reinforced Conc. - Emerg. Spillway	cy	4,500	250	1,125,000
Reinforced Conc. - Cradle & Collar	cy	160	200	32,000
Reinforcing Steel	lb	600,000	.40	240,000
R/c Pressure Pipe - 42" dia	LnFt	700	185	129,500
Cement Grout - between exist & new conduit (material & place	gal	10,500	2.00	21,000
Dismantle existing valves & install at new location	ea	3	3300	9,900
Drainpipe	LnFt	400	6.00	2,400
Misc. - Metalwork, Piezometers Monuments & etc	Job	1	15 000	15 000
Subtotal				4,134,600 $ 4,130,000

Calif
LL Hansen 2/22/79
Chesbro Dam Cost Estimate

Upper Llagas WS

Subtotal		4,130,000	
Contengency	15%	619,500	
		4,749,500	4,750,000
~~Eng. Services~~	~~12%~~	~~569,940~~	570,000
		~~5,319,440~~	~~5,320,000~~

COMPUTATION SHEET
SCS–ENG–523 Rev. 8–69

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE Calif.		PROJECT Llagas Cr. Watershed	
BY H. I.	DATE 11/2/76	CHECKED BY	DATE	JOB NO. 255
SUBJECT Tennant & Corrollitos Cr. @ Columbet Ave.			SHEET 1 OF

Objective.

Design the channel without removing some of the structures around Columbet Ave. on Reach 15 b and compare the cost differences from the original design made by DMJM. The following alternative were considered to be reasonable and practical.

1st Alternative: (Earth Channel.)

Reroute the channel around the structures adopting the same type of channel originally designed. This new route inevitably create new problems. It will be least cost when the length of the new route was kept minimum. It's found to be 250 ft longer than the original route. See Sht. 4 ~ 8 for details.

2nd Alternatives. (Concrete Lined Channel)

The channel follows the existing ditch and replace it with a rect., covered rect. or trapezoidal conc. lined channel which costs less than a pipeline but they cost more than an earth channel. The length remains the same as the original route. See Sht. 9 ~ 15 for details.

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SCS-ENG-523 Rev. 8-69

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE Calif.		PROJECT Llagas Cr. Watershed.		
BY H.I.	DATE 11/8/76	CHECKED BY	DATE	JOB NO. 256
SUBJECT Tennant & Corrallitos Cr. @ Columbet Av.				SHEET 2 OF

Comments.

As calculated, the alternative #1 (realigned earth channel) is cheaper than a conc. lined channel to construct when it is allowed to be built but from environmental point of view it creates a big impact to the residents. Especially when a new wide channel cuts through the area where there was no ditch existed before. The alternative #2 (concrete lined channel) would keep the aethetic impact to a minimum. The covered channel (reinforced conc. box) would cost 40% more than the rectangular channel. The following lists are the cost differencials (additional cost over the original design -- earth channel)

Alternative #1 $ 35,000 -- For 250 ft. of elongated channel.
(re-aligned earth channel)

Alternative #2.

a. Rectangular Conc. Channel ----- $ 78,000
170' of conc. channel in place of original ditch.

b. Reinforced Conc. Box Channel ---- $ 109,000

c. Conc. Lined (3/4:1 Side Slope) Channel $ 77,000

COMPUTATION SHEET
SCS–ENG–523 Rev. 8–69

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
★GPO: 1972 —460-109

STATE Calif.		PROJECT		
BY H. I.	DATE	CHECKED BY	DATE	JOB NO. 257
SUBJECT Tennant & Corrallitos Cr. @ Columbet Ave.				SHEET 3 OF

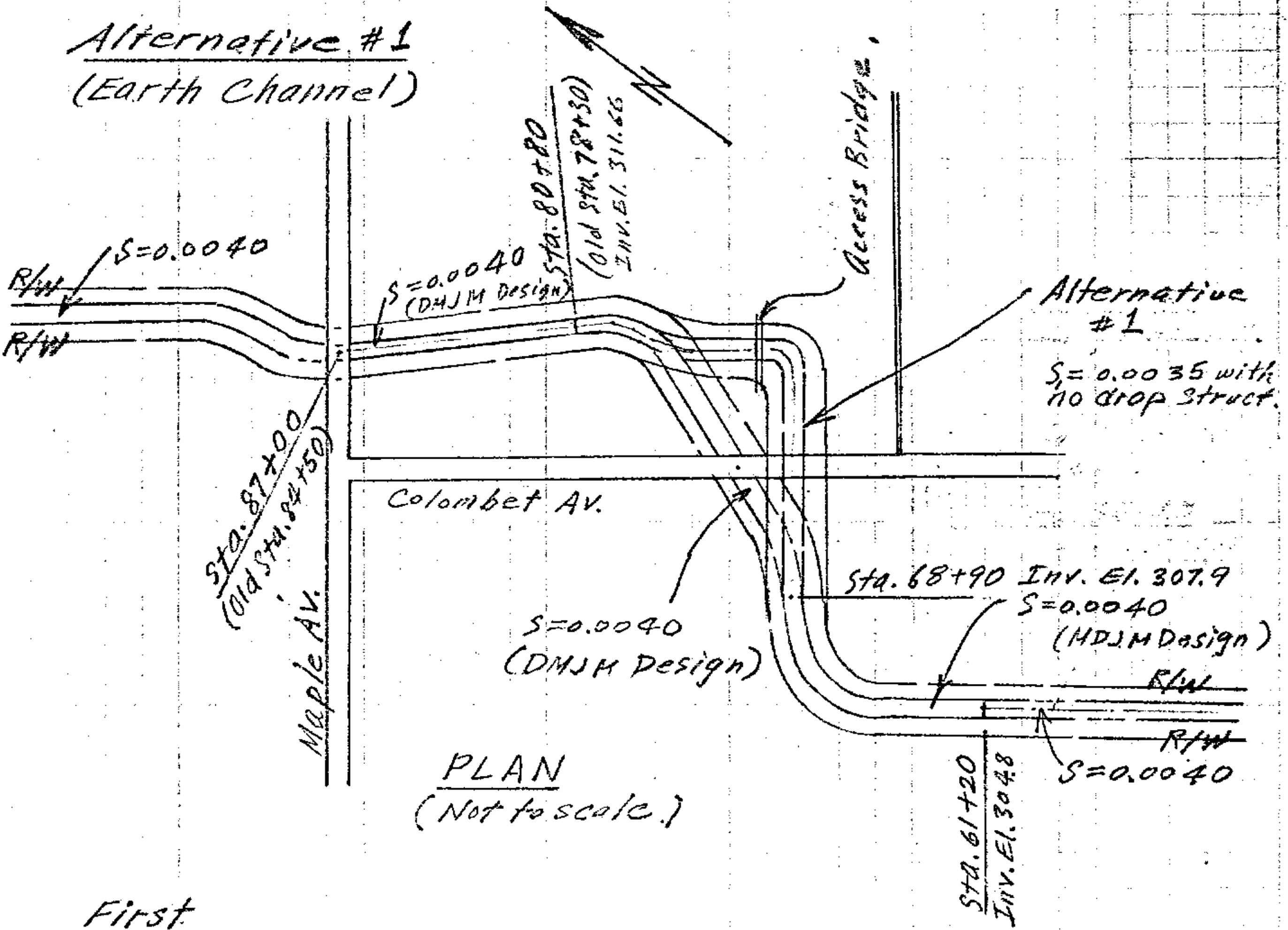
The cost of excavation of the problem section is somewhere \$ 35^{00}/Ft. It is insignificant compared to the cost of rectangular or conc. lined trapezoidal channel. The cost difference derived from the excavation was neglected. The rectangular channel can fit well within the R/W width shown on the map prepared by the "District" but the trapezoidal channel, even with 3/4 : 1 side slope, is too tight. It is necessary to provide two access bridges to cross over to the other side of maintenance road. Also the county road bridge have to be extended 20 ft more than the rectangular channel. The additional cost of these bridges are \$44,000. It makes this alternative 2c almost equal to the rectangular channel in their additional costs. The grouted rock riprap channel is out of question since there is no space for maintenance road.

COMPUTATION SHEET
SCS–ENG–523 Rev. 8–69

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE Calif.		PROJECT Llagas Cr. Watershed			
BY H. I.	DATE 10/19/76	CHECKED BY	DATE	JOB NO. 258	
SUBJECT Tennant & Corrallitos Cr. (Realignment)				SHEET 4 OF	

Alternative #1
(Earth Channel)



S=0.0040
R/W
R/W
S=0.0040 (DMJM Design)
Sta. 80+80 (Old Sta. 78+30) Inv. El. 311.66
Access Bridge
Alternative #1
S=0.0035 with no drop Struct.
Sta. 87+00 (Old Sta. 84+50)
Maple AV.
Colombet AV.
S=0.0040 (DMJM Design)
Sta. 68+90 Inv. El. 307.9
S=0.0040 (MDJM Design)
R/W
R/W
S=0.0040
Sta. 61+20 Inv. El. 304.8

PLAN
(Not to scale.)

First

Examine the channel design made by DMJM for the reach in question. Take a typical section at Sta. 60+00.

DMJM Design	SCS's check.
Q = 1,440 cfs Design Q	Q = 1440 cfs
✓ n = 0.035 For 100 yr storm	✓ n = 0.035
S = 0.004 ← Also natural grd. level	S = 0.004
z = 2	z = 2
b = 50'	b = 55' ← wider
d = 5' ← Water depth (rounded up?)	d = 3.9'
D = 6.7' ← Req'd channel depth	D = 6.0' --- D=7.5' was provided.
T = 77' ← Top width of channel.	T = 79'
v = 6'/sec. ← Rounded down?	v = 5.9/sec ← Allowable Velocity
DMJM used D=7.5'	

COMPUTATION SHEET
SCS-ENG-523 Rev. 8-69

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE Calif.	PROJECT Llagas Cr. W.S.		
BY H.I.	DATE 10/20/76	CHECKED BY	DATE
JOB NO. 259			
SUBJECT		SHEET 5 OF	

DMJM Design	SCS's Check
$S_c = 0.0116$	$S_c = 0.0195$
$V_c = 8.8'/sec$	$V_c = 8.9'/sec.$
$d_c = 3'$	$d_c = 2.8'$

Comment:

The velocity shown in DMJM design probably is rounded down. Actually it must be 6.2 ft/sec. which is a little more than the allowable velocity of 6 ft/sec. If the bottom width of channel were widened to 55' then the velocity comes down to 6 ft/sec. The min. Right of Way width for b = 55 ft will be 110 ft. ($W \doteq (7.5' \times 4) + 55' + 25' = 110$ ft)

Second.

Let's examine the channel configurations for the new route as shown in the "Plan" above.

The channel length between Sta. 78+30 to Sta. 68+90 will be 250 ft longer or 1,080 ft instead of 940 ft.

Now let's assign a new stationing for the proposed alignment adding 250 ft to the upstream of Sta. 68+90 (Sta. 68+90 remains as it is)

COMPUTATION SHEET
SCS-ENG-523 Rev. 8-69

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE		PROJECT		
BY	DATE	CHECKED BY	DATE	JOB NO. 260
SUBJECT				SHEET 6 OF

New Sta. 129+20 --- (Old 126+70) End of Project
" " 87+00 --- (Old 84+50) @ Maple Av.
" " 81+70 --- (Old 79+20) The channel (Design) cap. changes at Sta. 79+20

"Q" upstream of Sta. 81+70 --- 640 cfs
" downstream of " " --- 1440 cfs

(Use same channel grade (s=0.004) and inv. elev. 311.9 at Sta. 81+70.)

Upstream of Sta. 81+70

Q = 640 cfs
n = 0.035
S = 0.004 ---- DMJM
z = 2
b = 30' ---- DMJM
d = 3.4'
D = 4.6' --- Used D = 7.5'
T = (7.5'x4) + 30' = 60'
v = 5.3'/sec. < 6'/sec. ok
Min. R/W = 60 + 26 = 86 ft

S_c = 0.01338
V_c = 7.9'/sec.
d_c = 2.4'

$0.7S_c$ = 0.0093 > S = 0.004
ok

Downstream of Sta. 80+20

Q = 1440 cfs
n = 0.035
S = 0.0035 -- Assuming this grade remains for 1500' from Sta. 80+20 down to Sta. 65+20
b = 50'
d = 4.2'
D = 5.7' Down-stream of Sta. 65+20 will be S = 0.004 (Ref. "Plan")
(Use D = 7.5')
T = (7.5x4) + 50' = 80'
v = 5.9'/sec. < 6'/sec. ok
Min. R/W = 80 + 26 = 106'

S_c = 0.011
V_c = 8.6'/sec.
d_c = 3.0'

$0.7S_c$ = 0.008 > S = 0.0036
ok

COMPUTATION SHEET
SCS-ENG-523 Rev. 8-69

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE Calif.	PROJECT Llagas Cr. W.S.		
BY H. I.	DATE 10/27/76	CHECKED BY	DATE	JOB NO. 261
SUBJECT			SHEET 7 OF

Discussion:

The new channel route is 250 ft longer than the one designed previously, so the channel grade have to be adjusted to fit to the channel grade already designed. The new grade will be $s = 0.0035$ between Sta. 81+70 (old Sta. 79+20) and Sta. 68+90.

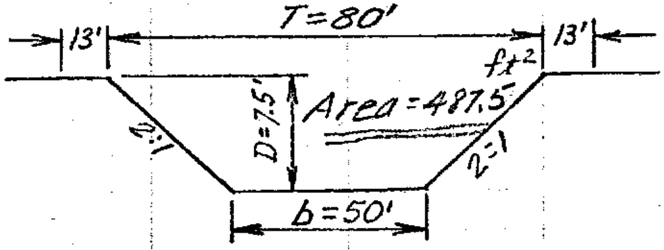
As shown in sheet 3 the new channel configurations for the new route.

For the 100 yr. storm $n = 0.035$ was used in the hydraulic calculations.

COMPUTATION SHEET
SCS–ENG–523 Rev. 8–69

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE Calif.		PROJECT Llagas Cr. W.S.			
BY H. I.	DATE 10/21/76	CHECKED BY	DATE	JOB NO. 262	
SUBJECT Additional Cost for New Route				SHEET 8 OF	



Typical X-Sec.
(no scale)

$A = \frac{(50+80)}{2} \times 7.5 = 487.5 \text{ ft}^2$

The additional costs for 250 ft of earth channel.

1. Channel Excavation for 250 ft @ $1.00/C.Y.
2. Assume 2 drainage inlets --- @ $1,000 ea.
3. Seeding for 0.7Ac − 0.3 Ac = 0.4 Ac @ $750/Ac.
4. Purchase of land for channel - 0.7Ac @ $3,500/Ac.
5. One access bridge @ $20.00/Ft²

1. Excavation --- $\frac{487.5 \times 250}{27} \times 1 = 4{,}513$ Say $ 4,600
2. Drainage Inlets (2) --- 2×$1000 = $2,000
3. Seeding 0.4×$750 = $300
4. Land Purchase $\frac{110^{*} \times 250}{43{,}560} \times \$3500 =$ $2,200 (additional area)
5. One access bridge $\overset{T}{80} \times \overset{W}{13} \times \$20$ = $20,800

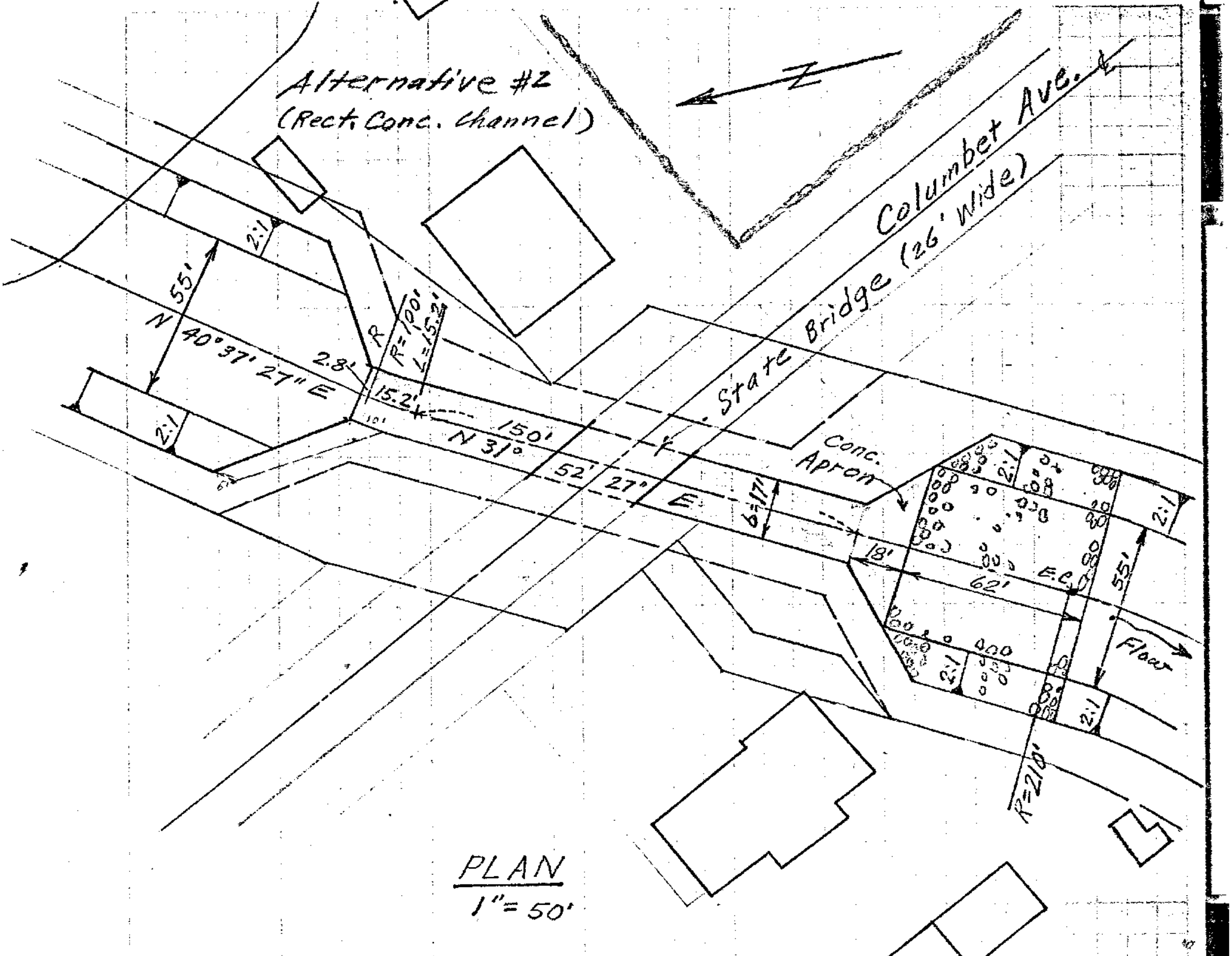
$29,900
15% Contingency $4,500
Total $34,400
Say $ 35,000

* R/W width --- 110 ft.

COMPUTATION SHEET
SCS-ENG-523 Rev. 8-69

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE Calif.		PROJECT Llagas Cr. Watershed		
BY H. I.	DATE 10/29/76	CHECKED BY	DATE	JOB NO. 263
SUBJECT Alternative #2 ◇ Rect. channel (Reach 15b)				SHEET 9 OF



PLAN
1" = 50'

Total Length of Rectangular Section L = 2.8' + 15.2' + 150' = 168'

COMPUTATION SHEET
SCS-ENG-523 Rev. 8-69

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE Calif.		PROJECT Llagos Cr. W.S.		
BY H. I.	DATE 11/2/76	CHECKED BY	DATE	JOB NO. 264
SUBJECT Alternative #2 -- Rectangular Channel				SHEET 10 OF

Alternative #2a.

Determine the channel configulations for the given conditions.

Given:

$Q = 1440^{cfs}$ (1%)
$S = 0.004$
$D = 7.5'$ (channel depth from DMJM's report on Reach 15 b)

Super-critical flow
$b = 17'$ --- $T = 17'$
$d = 6.0'$ Residual freeboad is $0.1 H_e = 0.9'$.
$v = 14.5'/sec.$ $D = 7.5'$ will provide plenty of freeboard.
$z = 0$
$n = 0.015$ (conc.)

$S_c = 0.00366$
$V_c = 14.1'/sec.$
$d_c = 6.2'$

$h_w = 6 \times 0.25 = 1.5'$ --- Height of wave.

The length of the conc. section is $L = 168'$.

The length (168') was determined by placing the channel along the original route and fitted the inlet and outlet wingwalls so as to avoid the structures.

COMPUTATION SHEET
SCS-ENG-523 Rev. 8-69

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

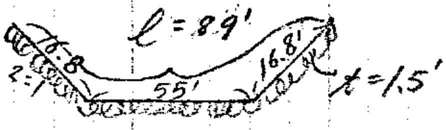
STATE Calif.		PROJECT Llagas Cr. W. S.		
BY H. I.	DATE 11/2/76	CHECKED BY	DATE	JOB NO. 265
SUBJECT Cost Estimates -- Additional Cost.				SHEET 12 OF

Alternative #2a (Rect. Channel)

2. Filter Material : $\frac{2}{3}$ of Conc. (Assumed)

$284^{c.Y.} \times \frac{2}{3} \cong \underline{190}$ c.Y.

3. Rock Riprap (Outlet only)



(with Cut off Wall 3' deep)

$1.5' \times 89' \times (\underset{2}{\underline{62' + 3'}})/27 = 321$ c.Y.

use $\underline{320}$ c.Y.

4. Fence on Both Sides of Channel

$L = (168 \times 2) + (30 \times 4) \cong \underline{460}$ ft

5. Excavation (Earth Work)

Assume that there is no cost difference for this work.

Total Additional Cost for Rectangular Channel

1.	Reinforced Conc. @ $200/c.Y.	$200 × 284 =	$ 56,800
2.	Filter Material @ $8/c.Y.	$8 × 190 =	$ 1,520
3.	Rock Riprap @ $25/c.Y.	$25 × 320 =	$ 8,000
4.	Fence @ $3/Ft	$3 × 460 =	$ 1,380
			$ 67,700

With 15% contingency → $ $\underline{78,000}$ Additional Cost for reinf. conc. Channel

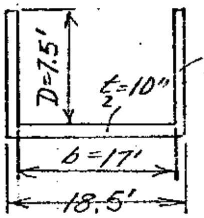
(Earth Channel was $ $\underline{36,000}$)

STATE Calif.		PROJECT Llagas Cr. Watershed		
BY H. I.	DATE 11/2/76	CHECKED BY	DATE	JOB NO. 266
SUBJECT Rectangular Channel — Cost Estimates				SHEET 11 OF

Alternative #2a

Cost Estimates. (Ref. Sht. 9 for the channel dimensions)

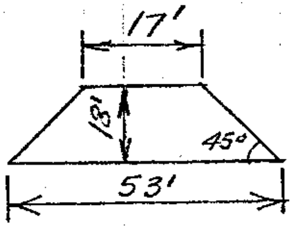
1. Reinforced conc.



a. Rect. Section.

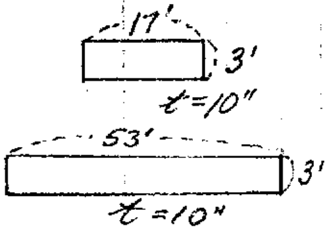
$\left\{\left(\frac{10}{12}\times 18.5\right)+\left(2\times\frac{9}{12}\times 7.5\right)\right\}\times 168/27$

$= \underline{166}$ C.Y. —①



b. Outlet Apron (no inlet apron)

$\frac{10}{12}\times\left\{\frac{(17+53)}{2}\times 18\right\}/27 = \underline{20}$ C.Y. —②

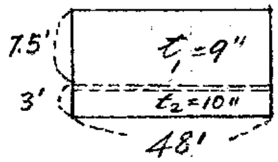


c. Cutoff Wall

Inlet ... $\frac{10}{12}(17'\times 3')/27 = \underline{1.6}$ C.Y.

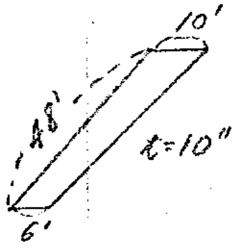
Outlet ... $\frac{10}{12}(53'\times 3')/27 = \underline{4.9}$ C.Y.

$\underline{6.5}$ C.Y. ③



d. Wingwalls (4 of them)

$\left\{\left(\frac{9}{12}\times 7.5\times 48/27\right)+\left(\frac{10}{12}\times 3\times 48/27\right)\right\}\times 4 = \underline{57.8}$ C.Y. ④



e. Footings (4 of them)

$\left\{\frac{10}{12}\times\frac{(10+6)}{2}\times(48/\sqrt{2})/27\right\}\times 4 = \underline{33.5}$ C.Y. ⑤

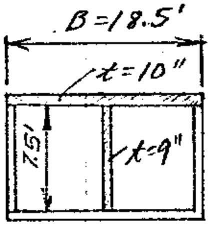
Total Conc. ①+ ⋯ + ⑤ = $\underline{\underline{283.8}}$ C.Y.

COMPUTATION SHEET
SCS–ENG–523 Rev. 8–69

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE Calif.
PROJECT Llagas Cr. W.S.
BY H.I.
DATE 11/4/76
CHECKED BY
DATE
JOB NO. 267
SUBJECT Reinforced Conc. Box — 168 ft long
SHEET 13 OF

Alternative #2 b (R.C.B.)



Add the top (cover) and center column to the rectangular channel.

Use B=19' for estimate.

Top (cover) $\frac{10}{12} \times 19 \times 168/27 = 100$ C.Y.

Center Column → $\frac{9}{12} \times 7.5 \times 168/27 = 35$ C.Y.

135 C.Y.

@ \$200/C.Y. 200 × 135 = \$27,000

Add 15% contingency \$ 31,000

Rectangular Channel \$ 77,900

Total R.C.B. → \$ 108,900

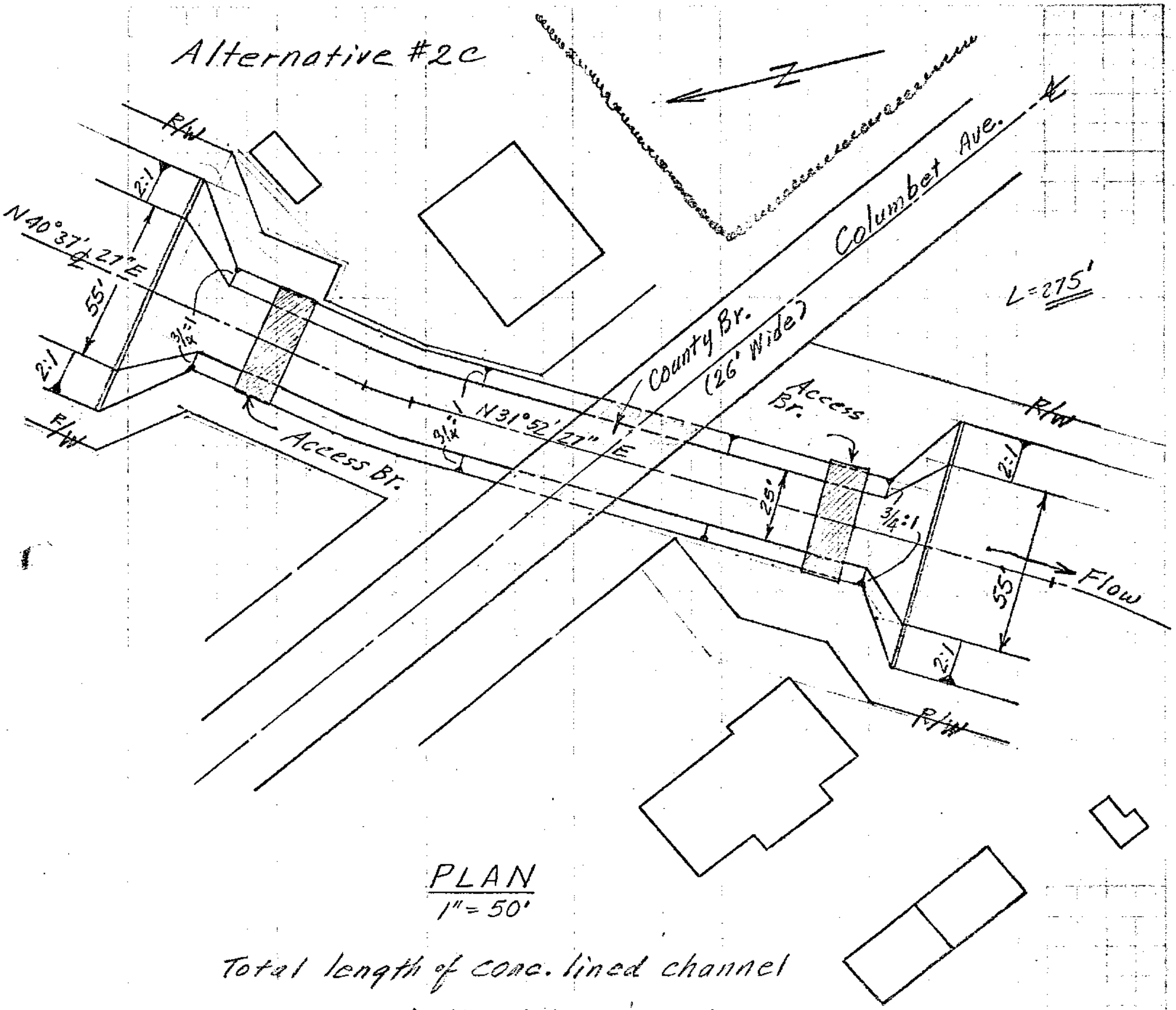
Use \$ 109,000

COMPUTATION SHEET
SCS-ENG-523 Rev. 8-69

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE Calif.
PROJECT Llagas Cr. Watershed
BY H.I.
DATE 11/12/76
CHECKED BY
DATE
JOB NO. 268
SUBJECT Alternative #2 Conc. Lined Channel.
SHEET 14 OF

Alternative #2C



PLAN
1" = 50'

Total length of conc. lined channel section including inlet & outlet transition.

L = 275'

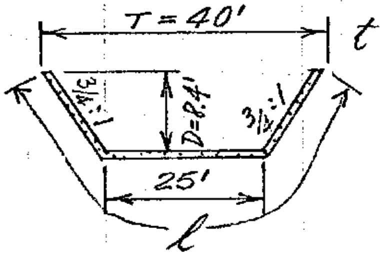
COMPUTATION SHEET
SCS–ENG–523 Rev. 8–69

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE Calif.
PROJECT Llagas Cr. W.S.
BY H. I.
DATE 11/10/76
CHECKED BY
DATE
JOB NO. 269
SUBJECT Tennant & Corrallitos Cr. @ Columbet Av.
SHEET 15 OF

c. Trapezoidal Conc. Lined Channel.
(Z = 3/4)

b = 25'
d = 5.9' --- D = 8.4' --- Req'd channel depth.
v = 8.4'/sec. T = (8.4 x .75) x 2 + 25' = 37.6'
n = 0.015
Q = 1,453 cfs
Say T = 40' overall.



t = 3" (Conc. thickness)

l = 25' + (10.5' x 2) = 46'

Total channel section including a bridge & transitions. L = 275'
use L = 280' for estimate.

Conc. 3/12 x 46' x 280'/27 = 120 c.y. ✓

Filter M. 130 c.y. x 2 = 260 c.y.

Cutoff Walls. $2(\overset{l}{46'} \times \overset{d}{3'} \times \overset{t}{1'}/27) = \underline{10}$ c.y. ✓
(Upstream & Downst.)

Reinforced Conc. @ $200/c.y. $200 x (120 + 10) = $26,000
Filter $8/c.y. $8 x 130 x 2 = $2,080
(twice of conc.)
$28,080
15% contingency $4,220
$32,300
Say $33,000

Prepare two access bridges (13' wide)
(Upstream & Downstream)
@ $25/Ft² $2(\$25 \times \overset{T}{40} \times \overset{W}{13})$ = $26,000
County rd. bridge @ $35/Ft² $35 x 20 x 26 = $18,000
(It req's 20' longer the rectangular channel)
Total additional Cost = $77,000

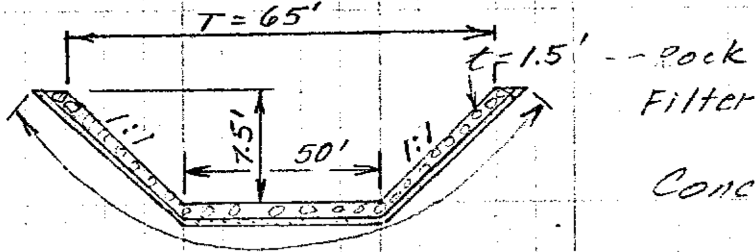
COMPUTATION SHEET
SCS-ENG-523 Rev. 8-69

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

STATE Calif.		PROJECT Lloqas Cr. Watershed.	
BY H. I.	DATE 11/9/76	CHECKED BY	DATE
JOB NO. 270			
SUBJECT Tennant & Corrallitos Cr. @ Columbet Av.		SHEET 16 OF	

* Alternative #2d

d. Grouted rock riprap channel. L = 200' in length.



Filter -- $\frac{1}{3}t = 0.5'$

Concrete & Rock Ratio

Conc. = 0.4 × (Rock)

$l = 50' + 22' = 72'$

Rock. $72' \times 1.5' \times (200 - 40)/27 =$ 640 C.Y.
(40' -- Bridge section) Say 650 C.Y.

Filter $1/3 \times 650 = 217$ C.Y. say 220 C.Y.

Conc. $0.4 \times 650 = 260$ C.Y.

Costs

Rock @ \$25/C.Y. \$25 × 650 = \$ 16,250
Filter @ \$8/C.Y. \$8 × 220 = \$ 1,760
($\frac{1}{3}$ of Rock)
Conc. @ \$90/C.Y. \$90 × 260 = \$ 23,400
\$ 41,410
15 % contingency \$ 6,211
\$ 47,621

Say \$ 48,000 ← Construction cost except the county road bridge @ Columbet Ave.

* There is no space for maintenance road when this type of channel is adopted.

UPPER LLAGAS CREEK - LEVEED FLOODPLAIN

The sponsors and their Citizen Addvisory Committee desired to retain existing riparian habitat wherever possible, while providing the desired degree of flood protection. One way of doing this is to install setback levees to confine the flood flows, leaving the existing creek undisturbed.

The setback distance, and thus the right-of-way width, depends on (1) the difference between the design flow and the existing channel capacity and (2) the depth of flow on the floodplain part of the cross-section. The sponsors wished to keep the levee height around five feet or less, so the flow depth on the floodplain was limited to about three feet.

A preliminary estimate of the setback requirements and right-of-way widths was then made. The estimates were made for various reaches of Llagas Creek, using typical sections and assuming uniform flow. It was found that the required distance between the levees would exceed 600 feet in some reaches. However, only a minimal setback would be required along Llagas Creek above station 522+00. The sponsors, following the advice of the advisory committee, decided to adopt the leveed floodplain approach along portions of Llagas Creek upstream of this station.

A second approximation of the setback distance was then made using the WSP-2 computer program. Water surface profiles were run using Manning n-values of 0.051 for the existing channel and 0.050 for the floodplain. Setback distances were adjusted until an arrangement was found that would give a maximum water depth on the floodplain of about three feet.

A setback of 50 feet downstream of station 568+50 and 20 feet from station 574+00 to 687+00 appears adequate. The resulting water surface profile is tabulated on sheet 276. Further refinements can be made during final design when more detailed cross-section and right-of-way information is available.

The other item considered was the effect of the levees on velocities in the existing channel. To determine this, WSP-2 runs were made for two cases: one for existing conditions (no levee) and one for the proposed levee arrangement. These runs were made with n-values of 0.035 for the channel and 0.050 for the floodplain. Runs were made for four discharges, ranging from 2700 cfs (10% peak) to 5400 cfs (1% peak).

Velocities are plotted against station on sheets 280 and 281. Velocities with and without levees are shown for each discharge. The velocities shown are for the channel portion of a segmented cross-section. Floodplain velocities are generally less than 2 feet per second and exceed 2.5 feet per second at only two cross-sections: 3.75 feet per second at 668+38 and 2.65 feet per second at 686+00. Mechanical protection of the levees can be provided in thse areas.

Inspection of the velocity profiles shows the effect of the levees to be minimal in most places. It is most pronounced around stations 668+38 and 686+00. For these two locations, velocities with and without levees are plotted against discharge on sheet 282.

What this all shows is that the existing channel will p~~/~~ass a substantial part of the design flow. As a result, setback levees can be used to reduce the floodplain width to 20 to 50 feet on each side of the channel. However, the velocities that will occur in the natural channel (both with and without the levees) are higher than would be tolerated in a constructed channel. Some mechanical protection can be provided where velocities are especially high, but too much would defeat the purpose of the scheme, which is to preserve the character of the existing channel. In any case, the levees will be felt only rarely. The sponsors (specifically the Santa Clara Valley Water District) have been advised that some erosion can be expected during large flows and that the eroded material will be deposited downstream in the constructed channels where velocities will be lower. The Santa Clara Valley Water District (SCVWD) will be responsible for maintenance of the entire system and prefers the occasional maintenance to the complete rebuilding of the channel. The SCVWD has built and is maintaining similar channels elsewhere in the county and is fully aware of its maintenance responsibilities. The SCVWD also wants to maintain existing [illegible] above the [illegible] because [illegible] Creek is used for [illegible] the recharge [illegible] is concerned that reduction of the [illegible] could [illegible] excessive [illegible] and that this would [illegible] will recharge. In this case, occasional scour [illegible] much to be [illegible] over frequent [illegible].

Calif
LL Hansen 3-5-79
Leveed Flood Plain

Upper Llagas Creek WS

This section sets forth the analysis of the channel sizing and the type of structures for Upper Llagas Creek between Stations 522+38 and 687+24.

Computer runs were used to make the analysis. Levee set backs from the creek were taken at 20 and 50 feet. "n" values of 0.035 and 0.05 were used with flows of 2700, 3500, 4500 & 5400 CSM. Water surface profiles were the basis of the analysis.

An attempt was made not to encroach on the levees except in minor areas. The flows were thus contained within the natural confines of the stream topography and the levees acted as freeboard except at 100yr conditions when they contained the flow.

Comparisons were made and the concLussions follow:

1. N = 0.050
2. Set back
   50 feet - Sta: 529+55 to 573+92
   20 feet - Sta 573+92 to 661+95
   50 feet - Sta 661+95 to 687+24

Besides the cost benefit this type of construction also preserves the riparian vegitation along the creek.

The following tabulations and graphs were developed from the computer runs. Several runs were made. The final runs were for n values of $n=0.035$ and $n=0.050$. An $n=0.051$ was used to evaluate depth of flow in the channel while an $n=0.035$ was used to evaluate velocity. An n of 0.050 was assigned to the flow area outside of the channel. Levee set back distances from the channel were varied. It was concluded that 50 + 20 foot set backs would be used.

Note - for ref, the computer runs were made in June, 1977.
vrs 1-31-80

# Water Surface Profile
from Depth run $n = 0.051$

CROSS-SECTION	Setback	Levee Toe Elev		WATER SURFACE	
		Left	Right		
52955	50′	256	254.3	255.0	
53796	↓	257.8	256.4	258.8	
54791		258.4	262.4	261.6	3.2
55423		263.5	263.7	263.9	
56200		261.7	263.1	265.3	3.6
56373		263.3	266	265.7	2.4
56656		267	266.5	266.8	
56856		267.5	264.5	267.4	2.9
57392	20′	267.5	268	268.7	
58075	↓	269.5	270.4	270.4	
58263		271.4	272	270.9	
58820		272.7	272.8	272	
59348		275.5	274	273.2	
59848		273	276.7	274.3	
60474		276.9	278.2	275.9	
60765		277.9	278	276.7	
61496		281.1	280	279.3	
61959		282	282	281.2	
62731		288	288.5	284.6	
63370		287	284.2	286.9	
63871		288.6	286.7	288.2	
64413		287.7	290.4	290.1	
65051		292.2	291.7	292.3	
65643		292.2	293	294	

N=.051

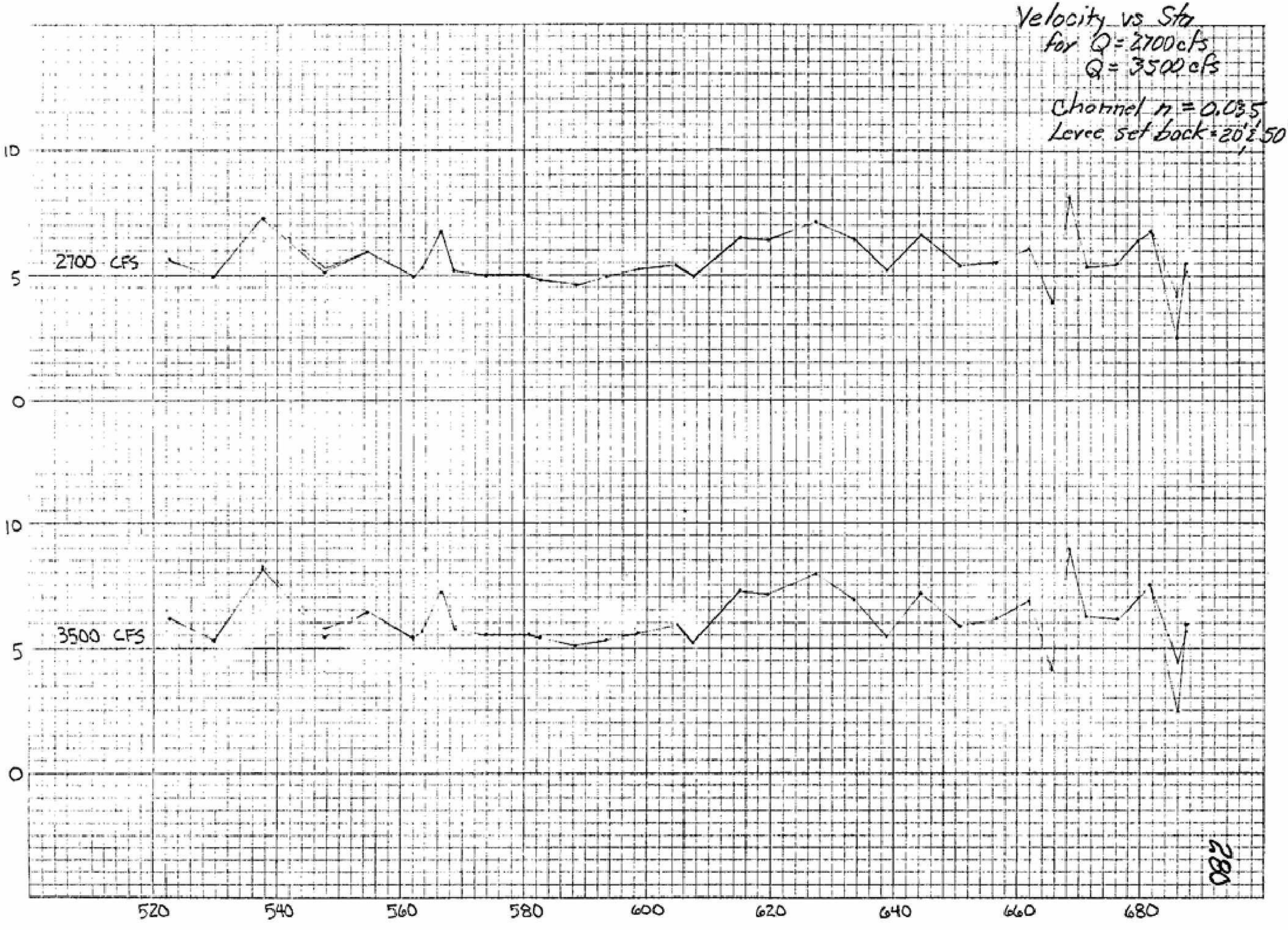
Cross-Sec.	Set back	Levee toe Elev		Water Surface
		Left	Right	
66195	20	293.6	295	295.7
66573		295.2	295.6	296.7
66838		294.5	296	297.7
67122		298.7	298.4	298.9
67612		298	298.8	300.4
67995		298.5	300.8	301.6
68170		301	299.9	302.1
68600		295.9	301	303.1
68724		308.5	309	303.2

Water Surface Profile
from velocity run n = 0.035

CROSS-SECTION	Set back	Levee toe elev Left	Levee toe elev Right	WATER SURFACE
52955	50′	256	254.3	254.3
53796		257.8	256.4	257.7
54791		258.4	262.4	260.6
55423		263.5	263.7	262.6
56200		261.7	263.1	264.1
56373		263.3	266	264.4
56656		267	266.5	265.5
56856		267.5	264.5	266.2
57392	20′	267.5	268	267.4
58075		269.5	270.4	269.1
58263		271.4	272	269.5
58820		272.7	272.8	270.6
59348		275.5	274	271.7
59848		273	276.7	272.8
60474		276.9	278.2	274.3
60765		277.9	278	275.2
61496		281.1	280	277.6
61959		282	282	279.6
62731		288	288.5	282.8
63370		287	284.2	285.2
63871		288.6	286.7	286.7
64413		282.7	290.4	288.7
65051		292.2	291.7	291
65643		292.2	293	292.7

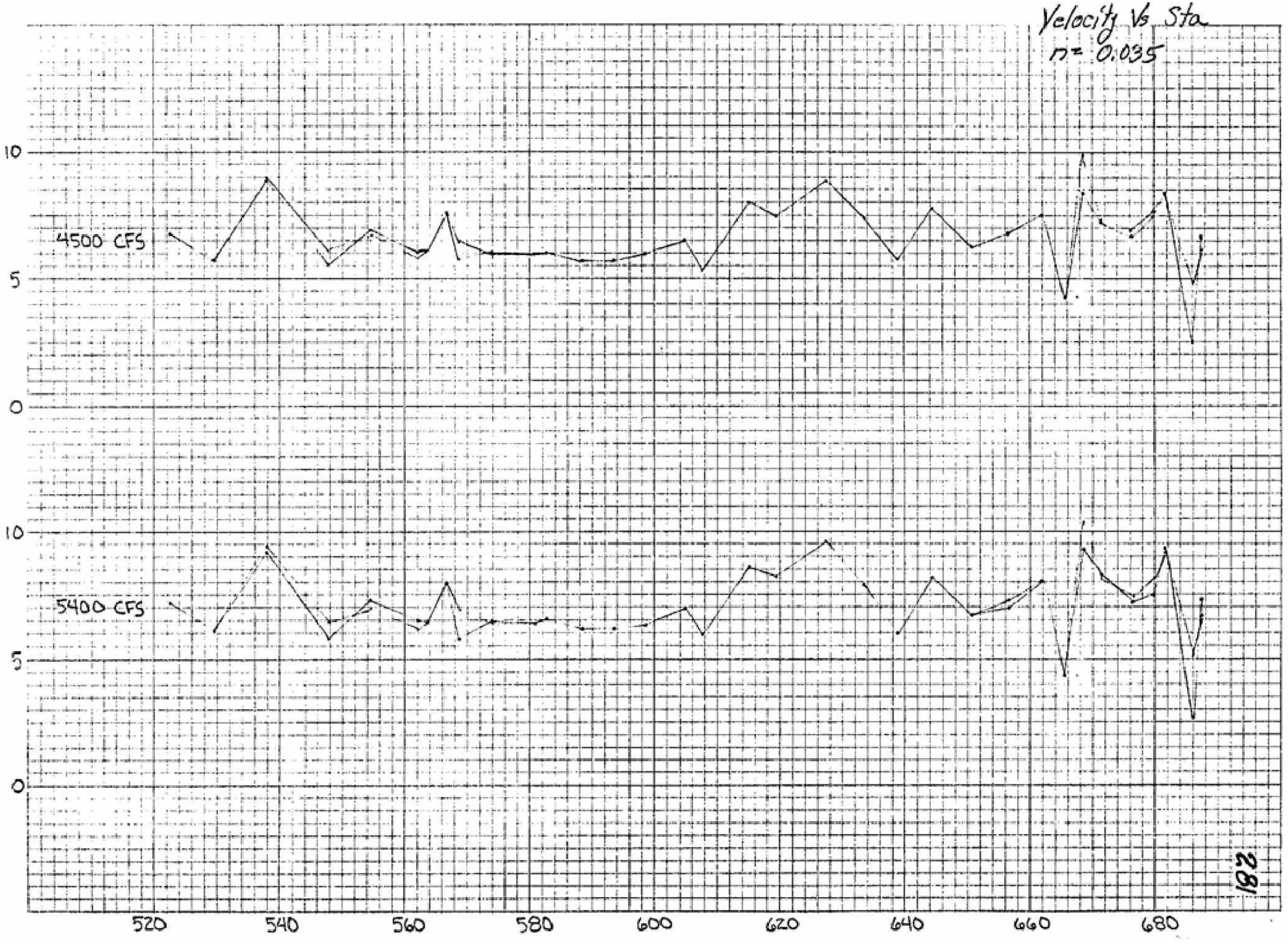
# Water Surface Profile
from Velocity run $n = 0.035$

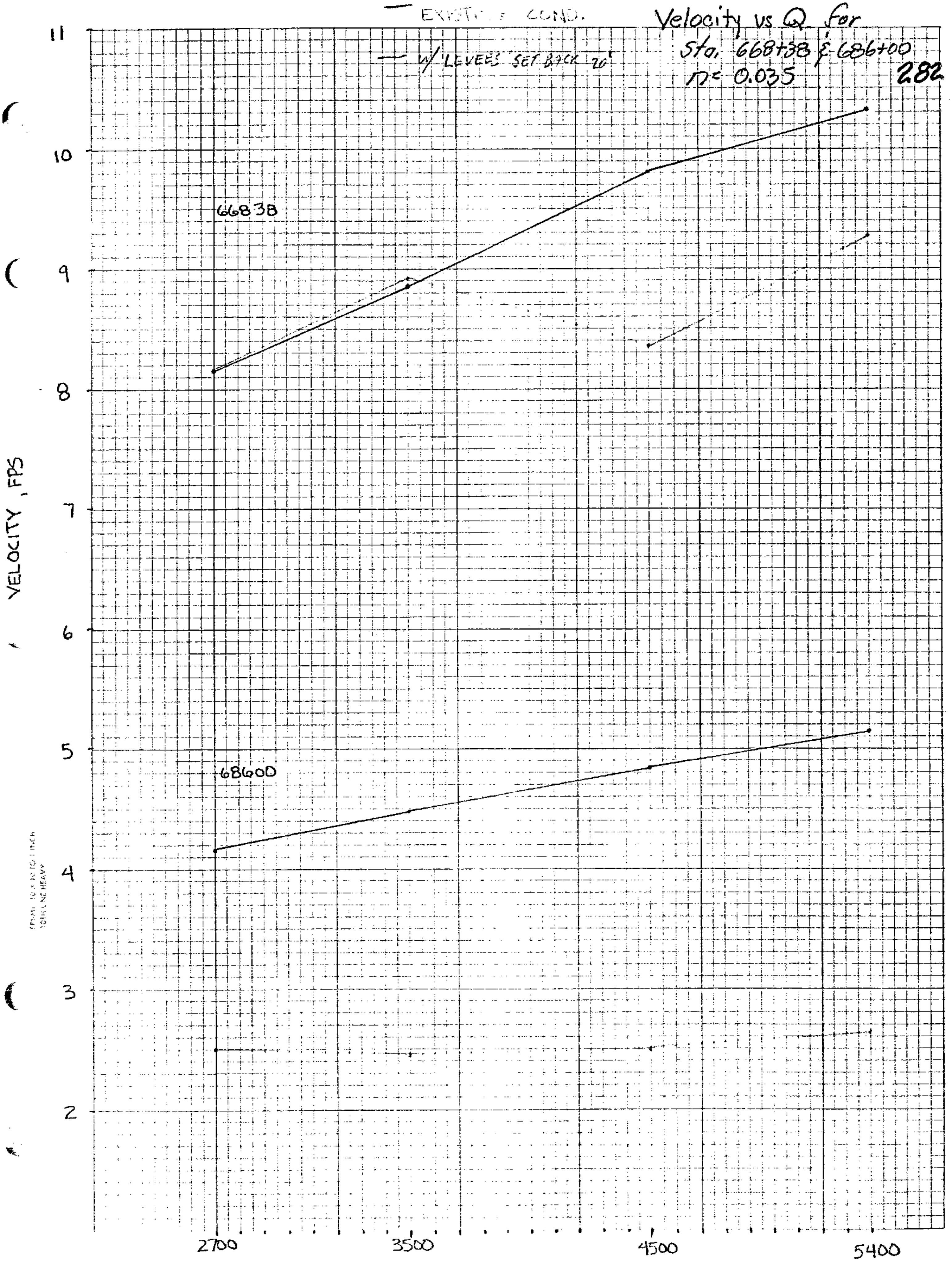
Cross-section	Set back	Levee Toe Elev Left	Right	
66195	20′	293.6	295	294.4
66573		295.2	295.6	295.6
66838		294.5	296	296.4
67122		298.7	298.4	297.7
67612		298	298.8	299.1
67995		298.5	300.8	300.1
68170		301	299.9	300.5
68600		295.9	301	301.8
68724	↓	308.5	309	301.8


Velocity vs Sta
for Q=2700cfs
Q=3500cfs

Channel n=0.035
Levee set back=20'&50'

[illegible] 10 X 10 TO 1 INCH
10TH LINE HEAVY





Velocity vs Q for
Sta. 668+38 & 686+00
n= 0.035

Calif
L L Hansen 4-3-79

Upper Llagas Creek Watershed

Allowable Channel Velocity

based on the previous calculations

The assumption of 6 fps used in the work plan is within the sediment free range and below the sediment laden range.

Tables 9 and 10 reveal that the D_{75} is larger than 1/4". The criteria used to design reach 1, which has been constructed, demonstrated that velocities could be higher than those shown on Tables 8 + 9.

Therefore it is concluded that the velocity of 6 fps used in the Work Plan analysis is reasonable.

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Allowable Channel Velocity

Upper Llagas Creek Watershed

From Soils data in Llagas Creek Watershed Engineering and Geologic Appendices Table 8A + 8B
See attached Copies

PI range between 13 + 24

Using Fig 6-2 check within PI Range
Sediment laden
PI = 13
ML, OL, SM curve Sediment Laden

$V_b = 3.95$ $A = 1$
F
1%
$F = 1.63$
D
$d = 10$
$D = 1.25$ $C_e = 1$

$V_a = V_b \times D \times A \times F \times C_e = (3.95)(1.25)(1)(1.63)(1) = \underline{8.05\ fps}$

PI = 24

V_b ML, OL, SM, MH, OH curve $A = 1$
$V_b = 5.0$
F 1%
$F = 1.63$
D
$d = 7.2$
$C_c = 1$
$D = 1.18$

$V_a = 5.0(1.18)(1)(1.63)(1) = \underline{9.62\ fps}$

Sediment free
PI = 13
Same as above except $V_b = 2.45$
$V_a = 2.45(1.25)(1)(1.63)(1) = \underline{4.99}$

PI = 24
Same as above except $V_b = 3.5$
$V_a = 3.5(1.18)(1)(1.63)(1) = \underline{6.73\ fps}$

Using 1%

Sediment laden	8.05 — 9.62 fps
Sediment free	4.99 — 6.73 fps

TABLE 8A
CHANNEL DESIGN SUMMARY

COHESIVE SOILS

Reach	PI	Ta (lb/sq.ft)	d (ft.)	s (ft./ft.)	b (ft.)	b/d (ft./ft.)	wds (lb/ft.^{2})
LOWER LLAGAS CREEK WATERSHED							
Llagas Creek							
0+00 to 30+00	22	0.87	9.3	0.0010	150	16.1	0.58
30+00 to 47+50	22	0.87	11.5	0.0010	150	13.1	0.72
47+50 to 93+40	22	0.87	12.8	0.0010	120	9.4	0.80
93+40 to 121+00	22	0.87	13.9	0.0010	120	8.6	0.86
121+00 to 129+00	22	0.87	13.9	0.0010	120	8.6	0.86
129+00 to 150+00	22	0.87	13.9	0.0010	120	8.6	0.86
298+90 to 357+50	17	0.81	10.5	0.0012	100	9.5	0.79
357+50 to 386+00	15	0.79	10.5	0.0012	100	9.5	0.79
"A" Line							
0+00 to 55+00	15	0.79	11.6	0.0009	50	4.3	0.65
55+00 to 182+00	13	0.76	9.8	0.0013	46	4.7	0.78
182+00 to 211+00	19	0.85	8.0	0.0017	24	3.0	0.80
211+00 to 250+00	23	0.90	4.1	0.0035	35	8.5	0.89
250+00 to 285+00	23	0.90	4.1	0.0035	23	8.5	0.89
"B" Line							
182+00 to 226+00	23	0.90	7.2	0.0020	44	6.1	0.89
226+00 to 297+00	24	0.90	7.2	0.0020	40	5.5	0.90
"C" Line							
211+00 to 217+00	19	0.85	7.2	0.0020	8	1.1	0.70
217+00 to 233+00	19	0.85	5.6	0.0030	8	1.4	0.87
"D" Line							
217+00 to 245+00	19	0.85	2.8	0.0052	8	2.9	0.84

285

Pages 286 & 287 Deleted

TABLE 8B
CHANNEL DESIGN SUMMARY
COHESIVE SOILS

Reach	PI	Ta (lb/sq.ft)	d (ft.)	s (ft./ft.)	b (ft.)	b/d (ft./ft.)	R (ft.)	wds or WRs (lb/sq.ft.)
UPPER LLAGAS CREEK WATERSHED								
Upper Little Llagas								
46+50 to 75+50	20	0.85	8.0	0.0015	21	2.66	5.21	0.49
75+50 to 91+50	20	0.85	8.0	0.0015	11	1.33	4.62	0.43
91+50 to 130+20	20	0.85	7.6	0.0025	8	1.05	4.19	0.66
130+20 to 142+60	20	0.85	6.8	0.0025	8	1.19	3.80	0.59
142+60 to 195+15	Concrete lined section							
195+15 to 226+65	23	0.88	4.9	0.0045	6	1.23	2.78	0.78
West Branch Little Llagas								
0+00 to 17+00	20	0.85	5.6	0.0030	4	1.0	2.92	0.55
Lower Little Llagas								
0+00 to 6+00	20	0.85	8.0	0.0017	58	7.25	6.3	0.67
6+00 to 32+00	20	0.85	8.0	0.0021	45	5.62	6.04	0.79
32+00 to 52+00	20	0.85	6.6	0.0021	65	9.85	5.42	0.71
52+00 to 121+50	20	0.85	6.6	0.0023	50	7.6	5.2	0.75
121+50 to 221+00	20	0.85	6.0	0.0025	12	2.0	3.7	0.58
East Branch								
0+00 to 10+00	20	0.85	6.6	0.0023	33	5.0	4.91	0.71
10+00 to 86+30	20	0.85	8.0	0.0025	20	2.44	5.16	0.80
86+30 to 131+00	20	0.85	6.0	0.0031	19	3.16	4.06	0.79

TABLE 9
CHANNEL DESIGN SUMMARY
NON-COHESIVE SOILS

$V_a = 5.75 V_* \lg\left(12.27 \frac{R'}{D_{75}}\right)$

Reach	D_{75} (inches)	Ta (lb/sq.ft.)	V* (ft./sec.)	R'S (ft.)	S (ft./ft.)	R' (ft.)	Va (ft/sec.)	d (ft.)	b (ft.)	Vm (ft./sec)	~~wRS~~ wR'S (lb/sq.ft.)
Lower Llagas Creek Watershed											
Llagas Creek											
150+00 to 191+00	0.75	0.30	0.393	0.0043	0.0009	5.33	6.8	15.0	130	6.7	0.30
191+00 to 298+90	1.00	0.40	0.456	0.0065	0.0016	4.06	7.3	10.6	100	7.2	0.40
386+00 to 420+00	1.25	0.50	0.352	0.0039	0.0010	3.85	6.0	12.0	99	6.0	0.24
420+00 to 441+00	0.50	0.20	0.328	0.0033	0.0009	3.71	5.7	11.0	122	5.6	0.20
1/441+00 to 458+00	2.60	1.04	0.730	0.0164	0.0031	5.30	10.4	8.0	111	8.8	1.06
Upper Llagas Creek Watershed											
Llagas Creek											
1/458+00 to 498+15	2.60	1.04	0.730	0.0164	0.0031	5.30	10.4	8.0	111	8.8	1.06
498+15 to 513+00	1.50	0.60	0.560	0.0097	0.0030	3.23	8.0	8.0	60	8.0	0.60
513+00 to 580+00	2.00	0.80	0.645	0.0129	0.0026	4.97	9.5	7.0	85	7.0	0.80
650+00 to 687+00	2.00	0.80	0.645	0.0129	0.0030	4.30	9.3	7.0	78	7.5	0.80
687+00 to 703+70	2.00	0.80	0.645	0.0129	0.0042	3.08	8.7	7.0	65	8.8	0.80
703+70 to 735+00	2.00	0.80	0.645	0.0129	0.0045	2.87	8.6	7.0	42	8.7	0.80
Upper Little Llagas											
2/ 0+00 to 11+50					Existing Llagas Creek Channel						
11+50 to 46+50	0.40	0.16	0.287	0.0026	0.0010	2.56	5.0	8.0	28	4.9	0.16

1/ Design based on latest soils data.

2/ Design based on backwater curve.

February 1966

TABLE 10
UPPER AND LOWER LLAGAS CREEK WATERSHED PROJECTS

CHANNEL DESIGN CHECK – NEW SOILS DATA

LLAGAS CREEK – NON-COHESIVE SOILS

est ple mber	Station	D_{75} (inches)	d (feet)	b (feet)	s (ft/ft.)	n_t	s_t	T_∞ (lb/sq.ft)	T_∞/T_b	T_b	$T_b/0.4$	Armor diameter D?(inches)	Scour Depth (inches)	Allowable Velocities from TR-25, fig. 6-1 Tabular Value (ft/sec.)	D	$\overline{V}$ ft/sec.
7Q-1	410+00	0.60	12	99	0.0010	0.0235	0.00045	0.34	0.99	0.34	0.85	D_{84}	5.3	6.6	1.25	8.3
P-1	430+00	0.50	11	122	0.0009	0.0228	0.00038	0.26	1.0	0.26	0.65	D_{84}	4.1	6.1	1.25	7.6
12P-1	462+00	2.56	8	111	0.0031	0.030	0.0023	1.15	1.0	1.15	2.87	D_{76}	12.0	9.7	1.2	11.6
P-1	535+00	1.33	7	85	0.0026	0.0279	0.00165	0.72	1.0	0.72	1.80	D_{82}	10.0	8.4	1.18	9.9
P-1	570+00	0.70	7	85	0.0026	0.0242	0.00124	0.54	1.0	0.54	1.35	D_{90}	13.5	7.5	1.18	8.9
P-1	637+00	0.75	7	1/	0.0030	0.0245	0.00147	0.64	1.0	0.64	1.60	D_{85}	10.6	8.1	1.18	9.5
P-1	672+00	0.375	7	78	0.0030	0.022	0.0012	0.51	1.0	0.51	1.27	D_{88}	10.5	7.4	1.18	8.7
P-1	700+00	6.00	7	65	0.0042	0.0346	0.0041	1.79	0.99	1.77	4.44	D_{68}	13.9	11.0	1.18	13.0
Q-1	725+00	1.75	7	42	0.0045	0.0281	0.0029	1.26	0.98	1.24	3.10	D_{77}	13.5	9.9	1.18	11.7

Unimproved reach, no specific base width

February 1966

MATERIALS TESTING SECTION DATA SUMMARY SHEET

Project: [illegible] Unit 1-1
Location: [illegible]
291
Sheet 1 of 2

730552
see Sheet 2

M.T.S. No.	Field No.	Location & Description	Depth ft.	Field Class.	Unif Class.	Att. Limits L.L.	Att. Limits P.I.	T.D.S. %	Gs -#4	Gs +#4	Abs. %	Mechanical Analysis % by dry weight Gravel	Sand	Fines	Compaction Data ( ) γd p.c.f.	Opt. M. %	Undisturbed Sample Data γd p.c.f.	M %	Special Test Results Uncon. Comp. psf	Susp. Load V ft/sec	I.I.	No Susp. Load V ft/sec			
720550	1-66-1	70'W of ℄ @ 66+00	4.0-5.3		MH	77	17		2.81			0	29	71			47.4	91.0	277		2.46				
720551	2-71-1	70'W of ℄ @ 71+00	5.7-6.7		MH	81	27		2.75			0	15	85			52.9	72.5	275		0.48				
720553	4-82-1	70'W of ℄ @ 83+00	5.7-6.3		ML-2	NP			2.17			0	51	47			25.1	190.1	577	2.6	2.95	1.5	[illegible]	[illegible]	
730554	4-83-2	" " " " " " "	6.9-7.7		MH	65	17		2.65			0	31	69			57.3	70.6	401		1.25				
720555	5-87-1	70'W of ℄ @ 87+00	6.0-7.2		MH	74	25		2.75			0	12	87			70.7	47.7	635		3.30				
720556	5-87-2	" " " " " " "	8.6-9.6		MH	67	32		2.78			2	12	85			72.2	41.0	666		2.90				
720557	6-95-1	70'W of ℄ @ 95+00	8.7-9.7		SM-2	25	2		2.64			2	55	41			103.1	23.8	774	2.0	6.10	1.1			
730558	6-95-2	" " " " " " "	9.7-11.0		SM-2	34	10		2.72			3	52	45			100.5	21.0	425	4.0	1.25	2.5			
720559	6-95-3	" " " " " " "	6.0-7.0		MH	[illegible]	21		2.75			0	3	97			77.4	45.3	940		9.40				
720560	7-100-1	70'W of ℄ @ 100+00	6.0-7.0		ML	46	16		2.76			1	24	75			92.2	29.9	1170		16.0				
720561	7-100-2	" " " " " " "	10.0-11.0		ML	34	13		2.77			0	13	87			93.1	28.9	476		1.70				
720562	7-100-3	" " " " " " "	11.0-12.0		ML	31	7		2.73			0	29	71			—	—	—		—				
720563	8-113-1	65'W of ℄ @ 112+00	14.0-15.0		CL-ML	27	9		2.72			1	14	85			100.6	23.7	418		1.20				
720564	8-113-2	" " " " " " "	16.0-17.0		CL-ML	23	7		2.66			0	23	77			103.7	22.3	708		4.60				
720565	8-112-3	65'W ℄ @ 112+00	21.5-23.5		SM-[illegible]	27	7		2.72			9	50	41			109.7	19.0	260	2.7	0.36	1.7			
720566	8-113-4	" " " " " "	24.0-25.0		ML	34	9		2.77			1	12	87			107.5	20.3	4560		550				
720567	9-124-1	40'W ℄ @ 124+00	19.6-20.6		ML	32	8		2.78			0	19	81			92.0	23.5	980		10.5				
720568	9-124-2	" " " " " "	23.0-23.7		MH	53	22		2.77			0	7	93			87.7	34.8	860		7.50				
720569	10-132-1	50'E ℄ @ 132+00	17.7-18.7		ML	40	15		2.77			5	47	52			97.3	30.7	553		2.40				
720570	10-132-2	" " " " " "	17.8-21.0		CL-2	41	16		2.77			2	17	81			71.1	27.5	720		4.80				
720571	10-132-3	50'E ℄ @ 132+00	21.0-21.4		SC	20	10		2.77			37	46	12						4.7		3.0			
720572	—	—	—		—	—											—	—	—	—	—				
720573	10-132-5	" " " " " "	25.4-26.4		SC-SW	25	5		2.74			42	49	8						4.7		3.0			
720574	11-142-1	60'E ℄ @ 142+00	13.7-14.7		CL-1	31	9		2.75			2	42	56			103.1	23.4	580		2.10				
720575	11-142-2	60'E ℄ @ 142+00	16.7-17.2		SC	27	7		2.72			11	46	43			112.2	17.8	316	2.2	1.65	1.2			
720576	11-142-3	" " " " " "	17.2-17.8		SM-SC	24	5		2.72			5	66	29			112.0	15.8	208	2.0	0.21	1.1			
720577	11-142-4	" " " " " "	19.5-20.7		SC	29	9		2.69			1	50	49			110.9	17.4	1375	2.0		1.1			
720578	11-143-5	" " " " " "	22.0-22.6		SC	[illegible]	7		2.68			35	44	21						5.2		3.4			
720579	12-151-1	40'W ℄ @ 151+00	12.7-13.7		ML	47	20		2.81			0	15	85			102.4	25.2	2700		140				
720580	12-151-2	40'W ℄ @ 151+00	15.7-16.4		CL-2	46	20		2.81			0	17	81			99.7	24.9	2040		78.0				
720581	12-151-3	40'N ℄ @ 151+00	21.0-21.8		CL-ML	39	14		2.81			0	17	83			94.8	27.3	613		3.30				
720582	13-157-1	120'W ℄ @ 157+00	14.7-15.7		CH	58	30		2.77			1	9	90			92.4	[illegible]	1455		29.5				
720583	13-157-2	" " " " " "	20.4-21.1		ML	44	16		2.80			0	9	91			98.0	27.2	1750		45.0				
720584	14-167-1	120'W ℄ @ 167+00	10.0-10.5		MH	54	24		2.77			2	13	85			84.7	31.8	575		2.95				
720585	14-167-2	130'W ℄ @ 167+00	12.4-13.4		SM-1	33	9		2.72			15	52	33						3.1		1.9			
730586	14-167-3	" " " " " "	15.2-17.0		CL-1	31	10		2.76			3	36	61			101.0	21.1	1375		24.0				
730587	14-167-4	" " " " " "	20.0-21.2		CL-1	33	12		2.76			1	30	61			105.3	20.0	1840		52.0				
720588	14-167-5	" " " " " "	22.0-24.5		GC	32	10		2.79			43	40	17						5.5		3.7			
720589	15-176-1	℄ @ 176+00	10.9-11.9		ML	47	14		2.64			0	13	87			85.1	33.6	540		2.65				
720590	15-176-2	" " " "	12.0-12.5		CL	37	15		2.71			9	40	51			106.6	19.4	1380		24.0				
720591	15-176-3	" " " "	15.7-16.7		ML	43	15		2.83			0	22	78			11.5	21.7	843		7.10				

MATERIALS TESTING SECTION DATA SUMMARY SHEET

Project: [illegible] L-1
Location: [illegible]
Sheet 2 of 22

M.T.S. No.	Field No.	Location & Description	Depth	Field Class.	Unif. Class.	Att. Limits		T.D.S.	G_s		Abs.	Mechanical Analysis % by dry weight			Compaction Data ( )		Undisturbed Sample Data		[illegible]	Special Test Results V	T.P.	[illegible]
			ft.			L.L.	P.I.	%	-#4	+#4	%	Gravel	Sand	Fines	γ_d p.c.f.	Opt. M. %	γ_d p.c.f.	M %				
720572	15-176-4	℄ @ 176+00	21.8-23.5		SM-SC	27	7		2.77			2	67	31			105	17.6	424	2.0	1.85	1.1
720573	15-176-5	℄ @ 176+00	24.0-24.5		SW-SP	26	5		2.75			33	58	9						4.2		2.8
720574	16-182-1	70' W of ℄ @ 182+00	12.±		MH	62	27		2.80			2	19	79								
720575	16-182-2	" " " " " "	9.±		SM-2	NP			2.75			0	51	49						20		1.1
720576	17-195-1	℄ @ 195+00	13.±		MH	71	29		2.71			3	8	89								
720577	17-195-2	" " " "	17.±		CL-1	36	12		2.74			4	33	63								
720552	2-71-2	90' W of ℄ @ 71+00	6.9-7.9		SM-1	NP			2.70			0	66	34			28.1	173.9	356		0.76	

Comments: Velocities indicated are from Figure 6-1 TR-25

Tractive Power values were obtained from Figure 6.1-1, TR-25, and represent the allowable tractive power for the corresponding unconfined compressive strength. For unconfined compressive strengths above 750 p.s.f. the tractive power was extrapolated from an extension of the plot.

WL
11-5-78 292a

UPPER LLAGAS - MILES OF CHANNEL BY TYPE

(N)

LLAGAS	458+00 TO 498+15	3,630	(EQN: 483+50 = 487+35)
	658+50 TO 687+00	2,850	
E. LITTLE LLAG.	183+00 TO 220+85	3,785	
CORRALLITOS	0+00 TO 77+50	7,750 [1]	
TENNANT	77+50 TO 126+70	4,920	
		22,935 L.F. = 4.3 MI.	

(M)

LLAGAS	498+15 TO 522+00	2,385
W. LITTLE LLAG.	86+40 TO 227+35	14,095
E. LITTLE LLAG.	0+00 TO 183+00	18,300
		34,780 L.F. = 6.6 MI.

(O)

W. LITTLE LLAG.	11+00 TO 86+40	7,540 L.F. = 1.4 MI.
		12.3

LEVEED FLOOD PLAIN

LLAGAS	522+00 TO 582+00	6,000
	625+50 TO 658+50	3,300
	687+00 TO 743+00	5,600
		14,900 L.F. = 2.8 MI.

---

[1] INCLUDES 600± L.F. @ THE D/S END THAT IS ACTUALLY TYPE M (ROUGH EXCAV), BUT THE COST OF FINISHING IT IS TOO SMALL TO WARRANT A SEPARATE LINE IN TABLE 2.

SECTION XIX

# PROPERTY OWNERSHIP MAPS
for
CHESBRO DAM & RESERVOIR

Calif
L L Hansen 3-20-79
Chesbro Dam Landrights Maps Key

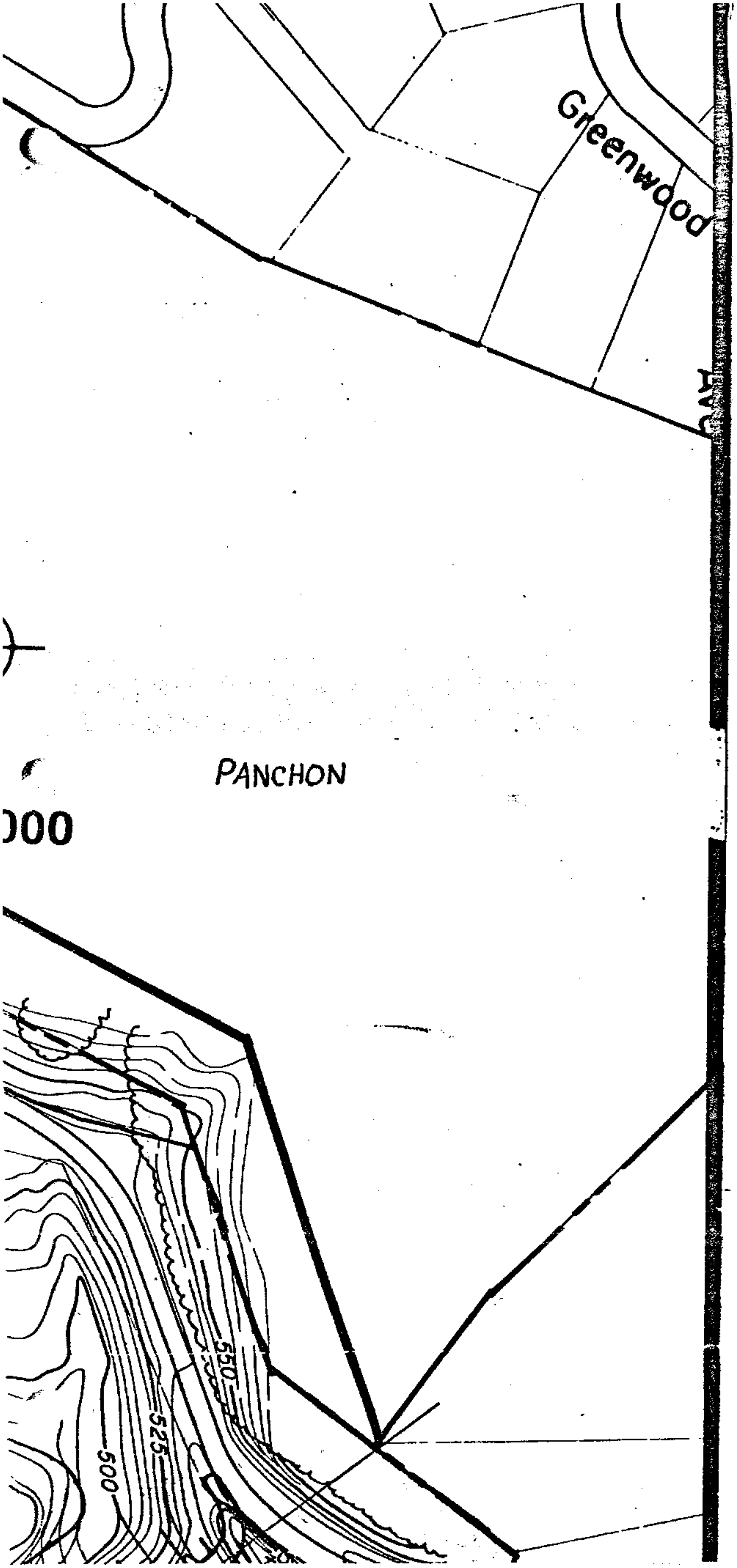
Upper Llagas Creek WS

Map Number Key

			20			15	14		
24	23	19	18	13	12	11	10		
22	21	17	16	9	8	7	6	4	1
							5	3	2

Chesbro Dam

295



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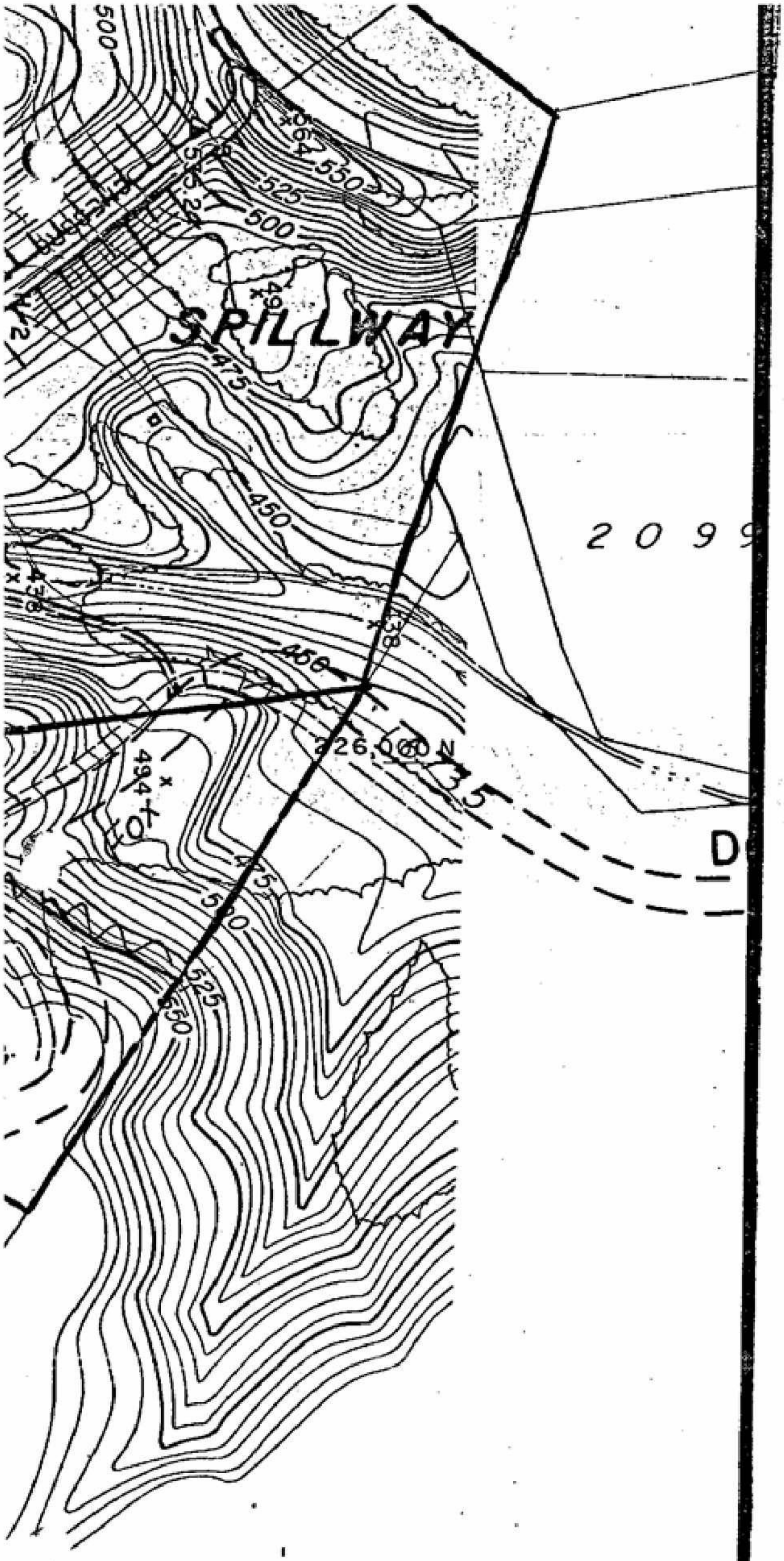
SPILLWAY
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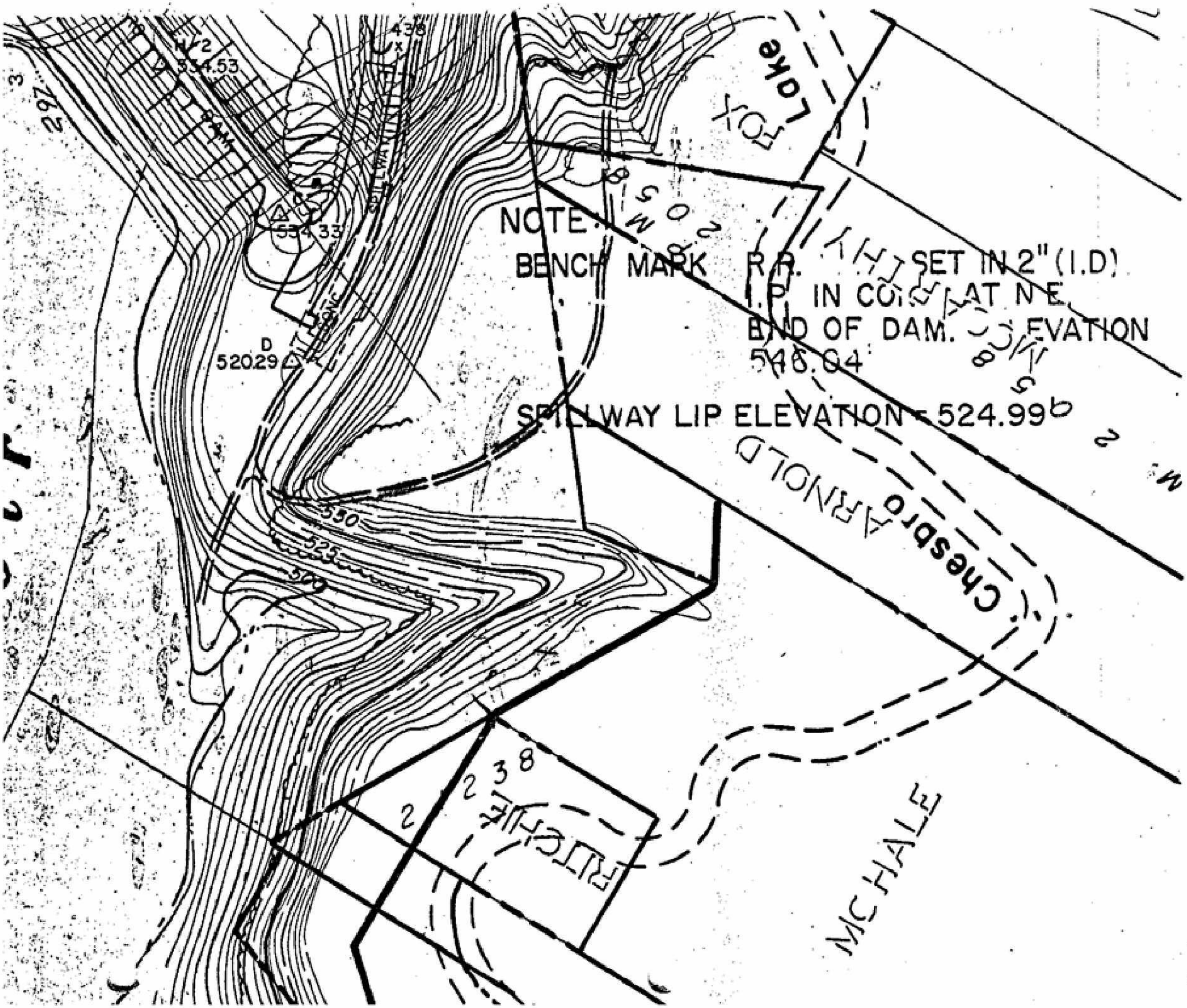
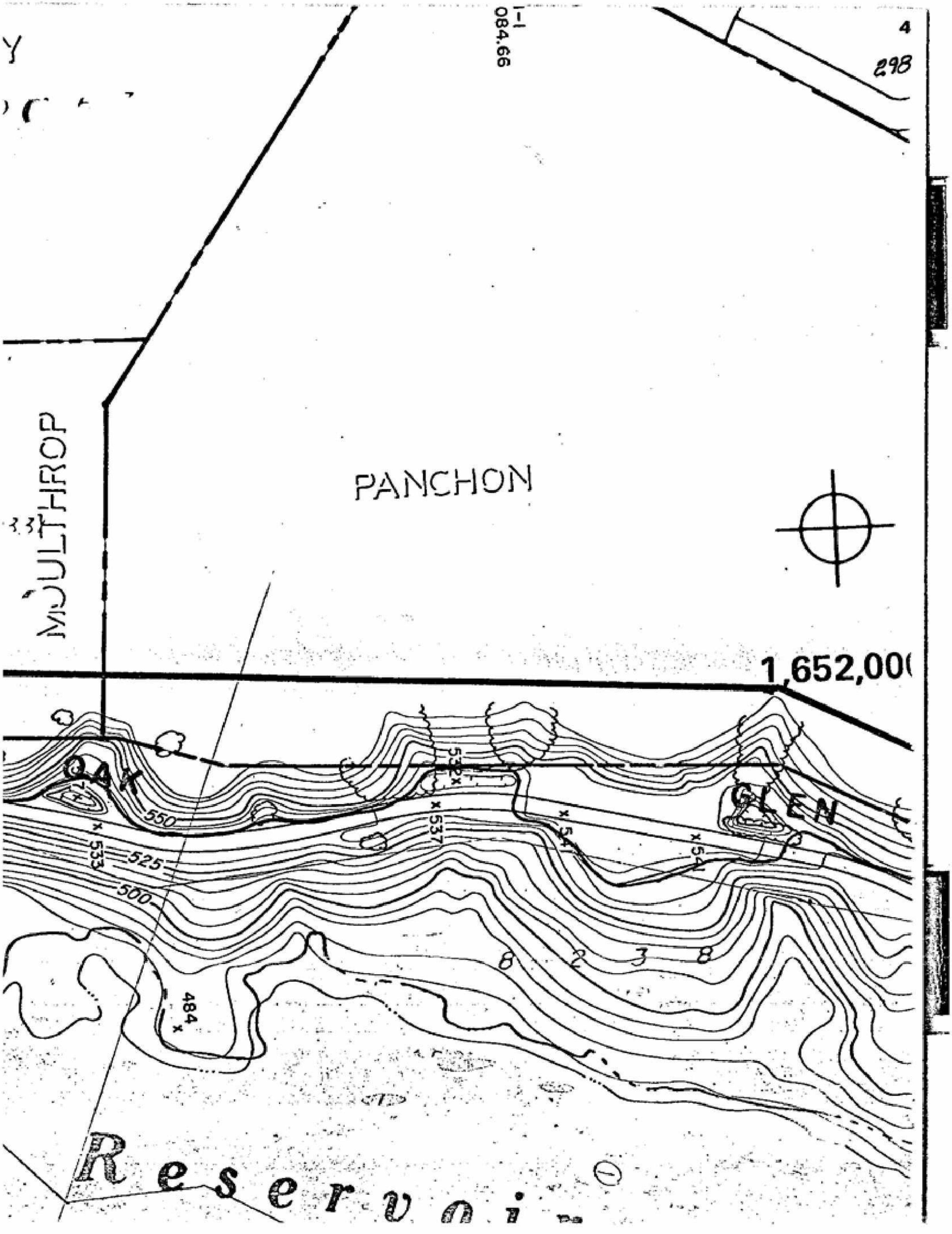
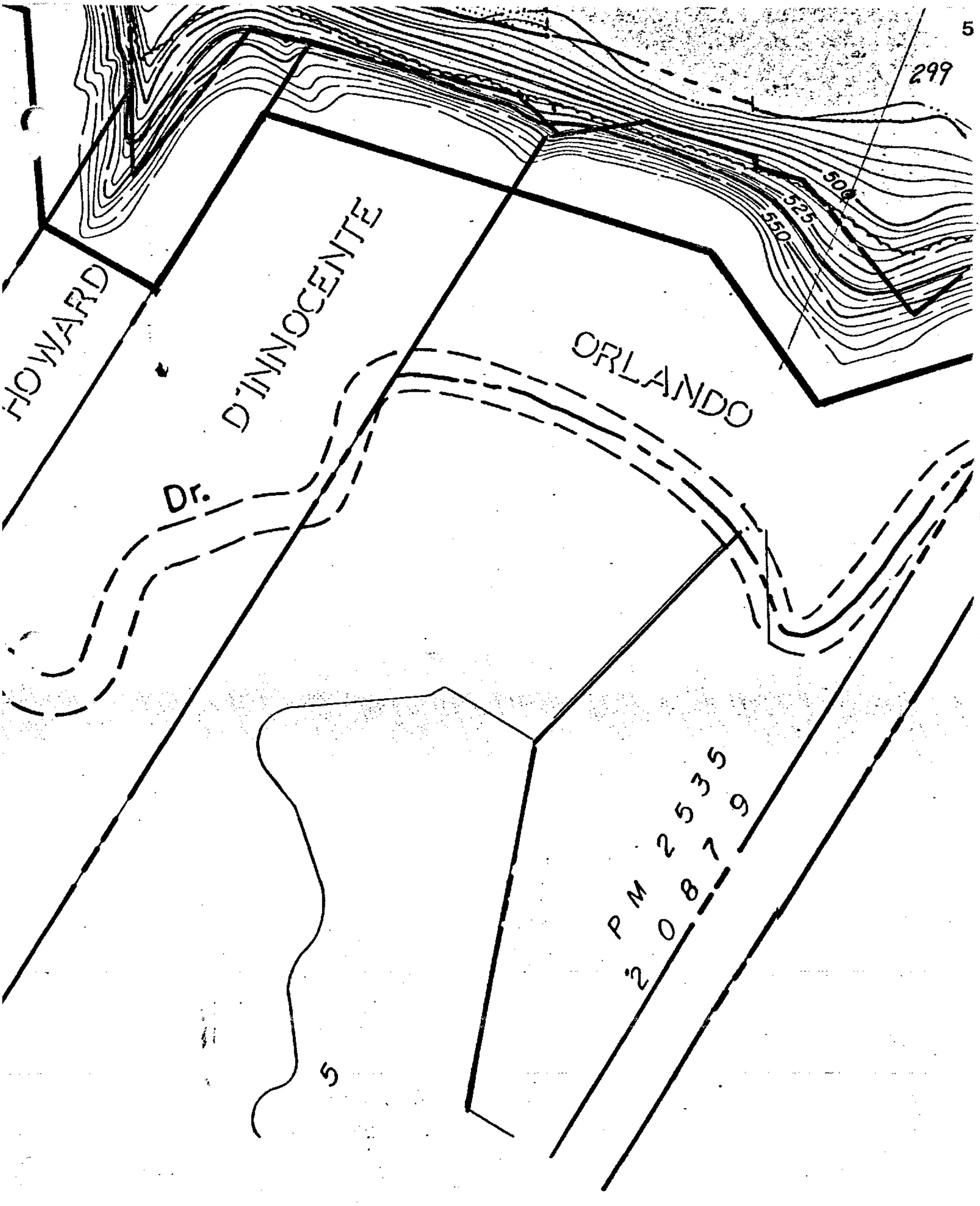
564
550
525
500
475
450
436
438
450
226,000 N
494
475
500
525
550
2099
735
D

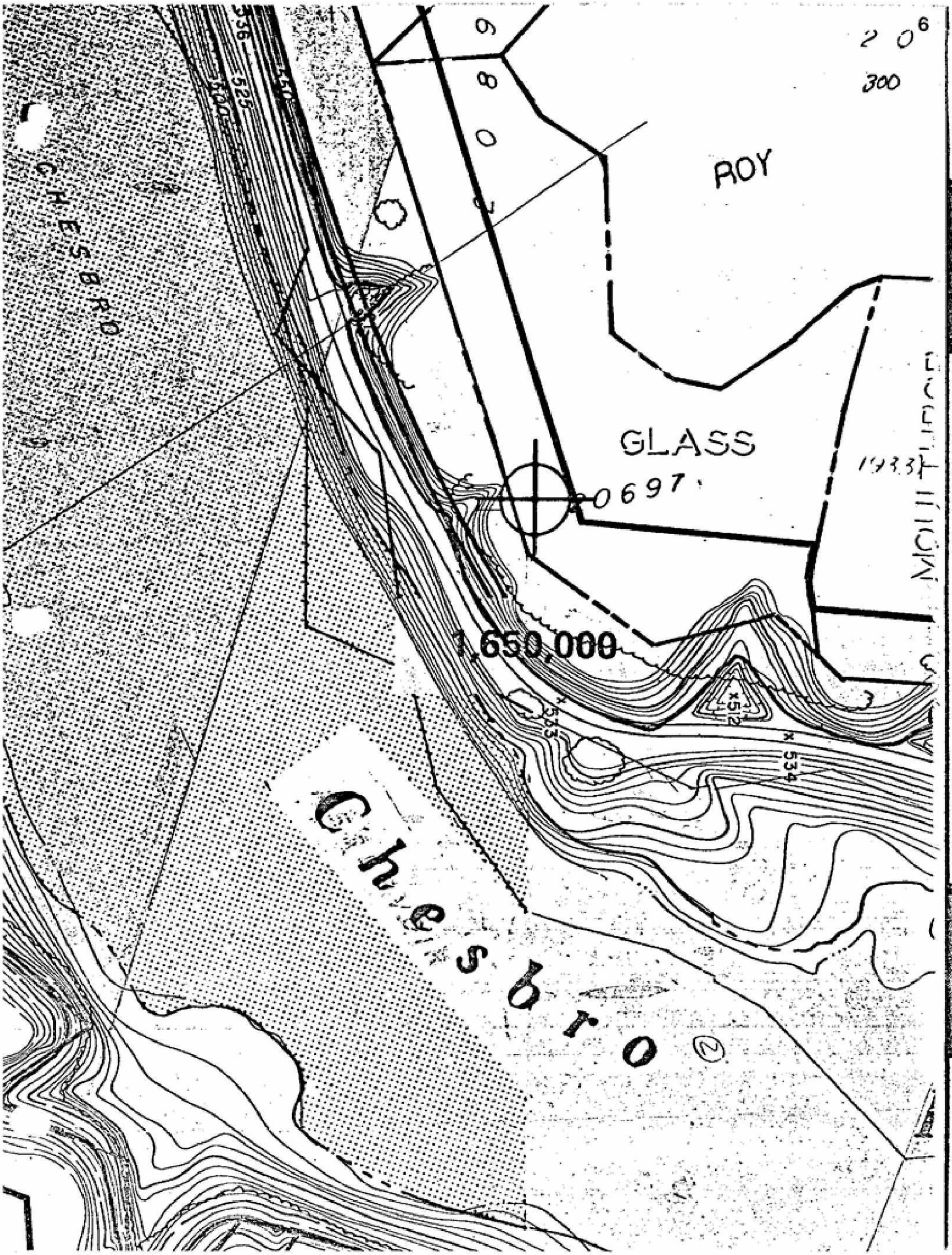


NOTE:
BENCH MARK R.R. SET IN 2" (I.D)
I.P. IN CONC. AT N.E.
END OF DAM. ELEVATION
546.04

SPILLWAY LIP ELEVATION = 524.99


1-1
084.66
4
298
Y
MOULTHROP
331
PANCHON
1,652,00
OAK
GLEN
550
533
525
500
532
537
54
54
484
8
2
3
8
Reservoi


299
500
525
550
HOWARD
D'INNOCENTE
Dr.
ORLANDO
PM 2535
20879
5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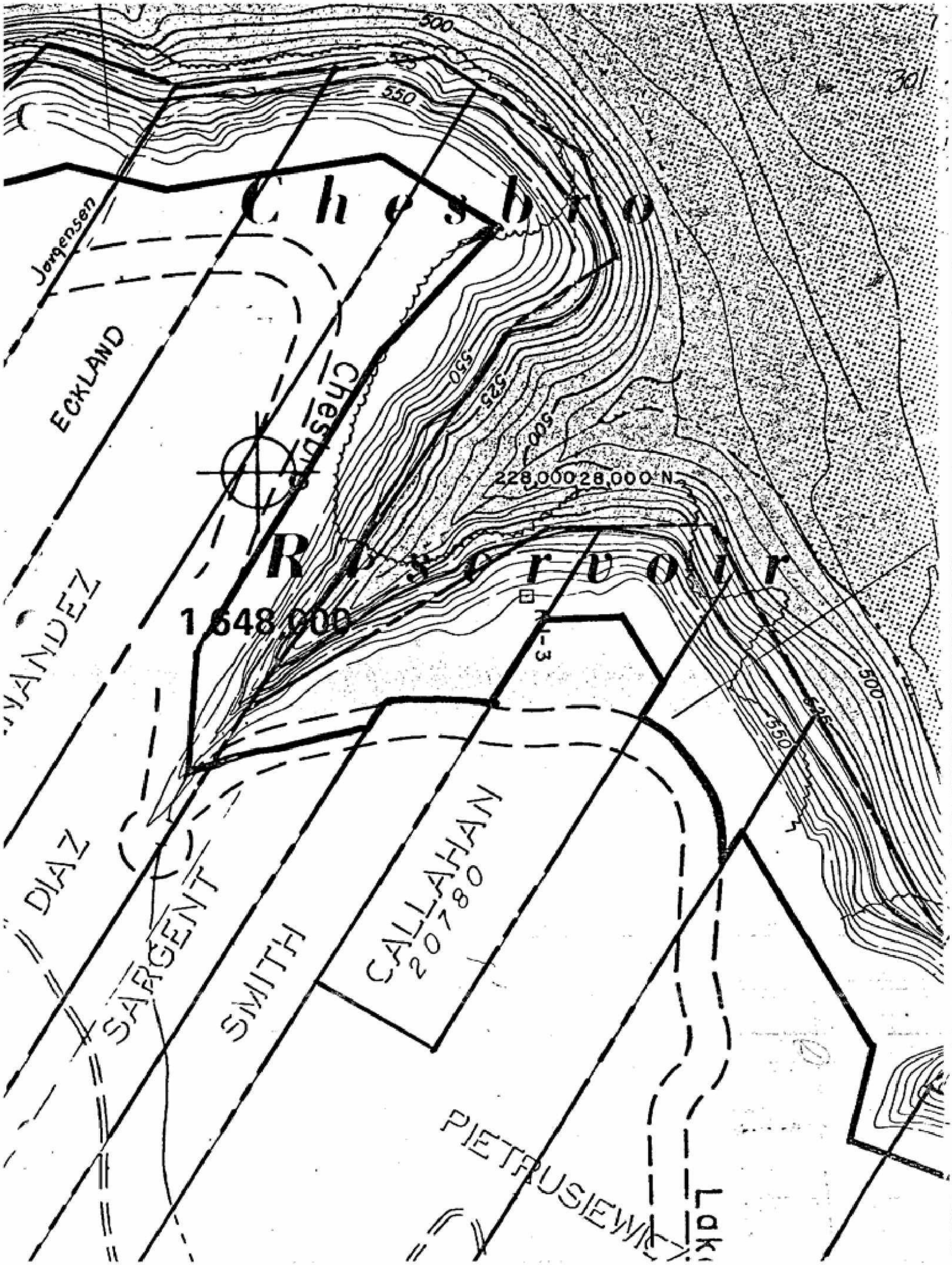
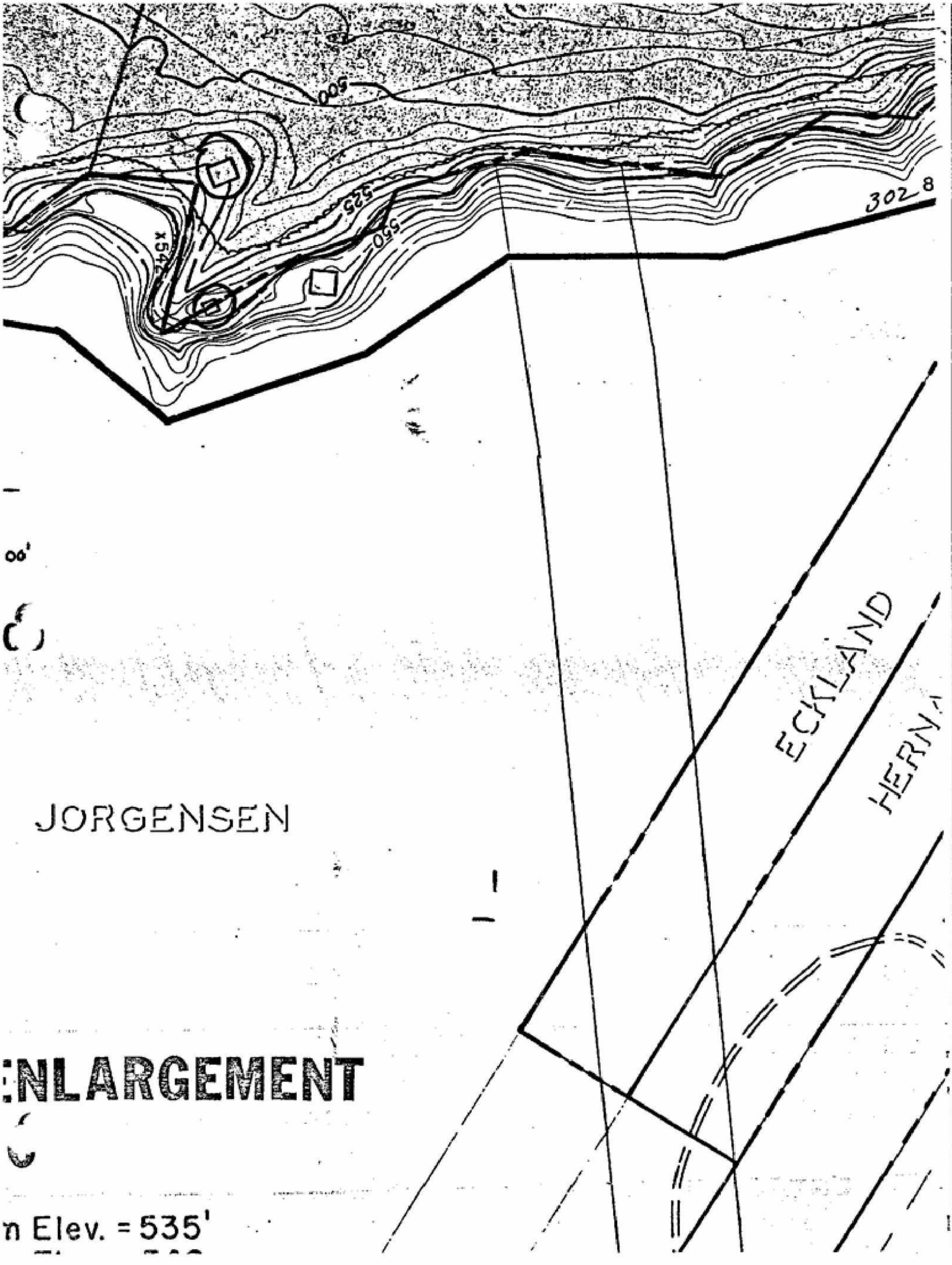
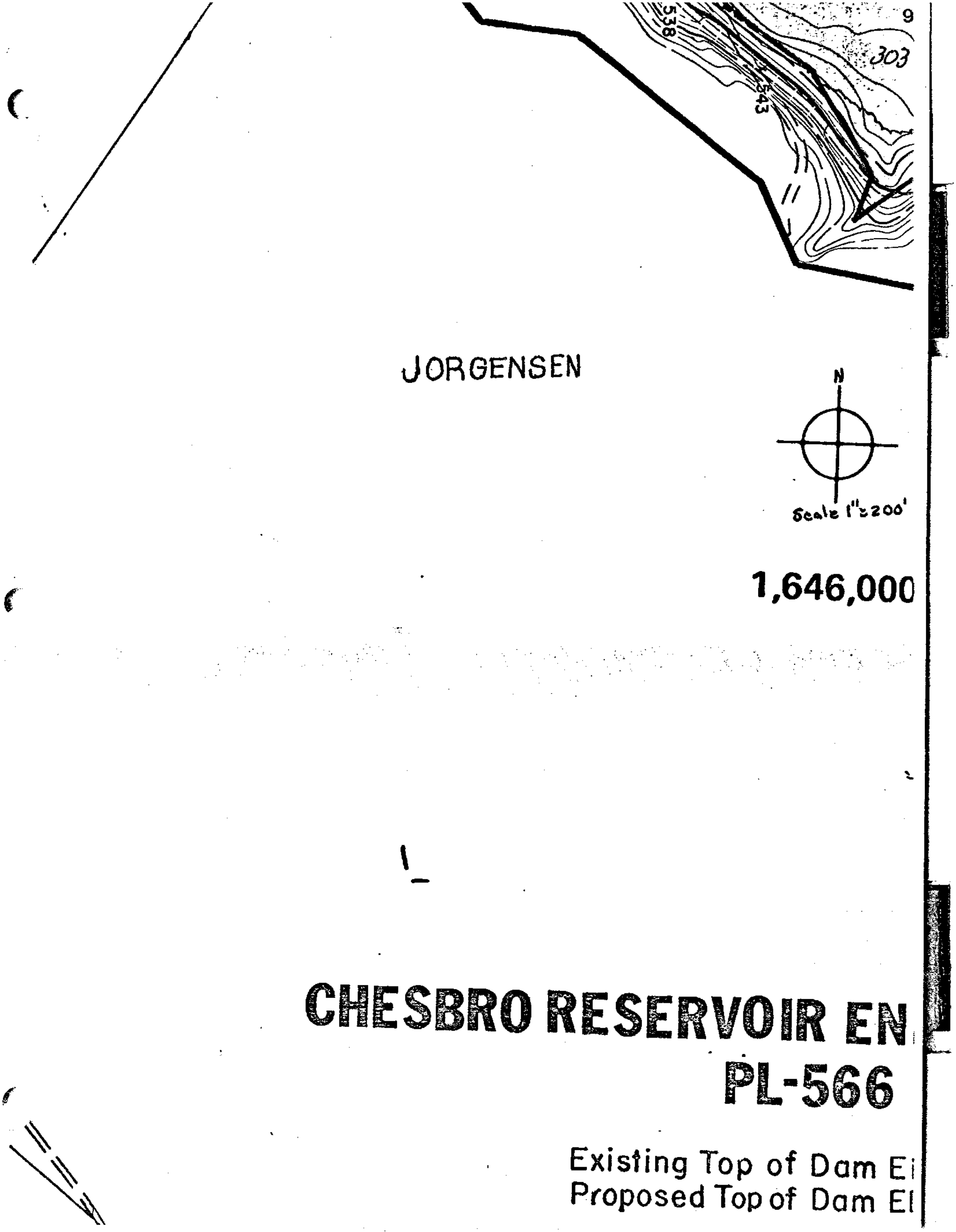
300
980
ROY
CHESBRO
536
525
550
500
GLASS
1933
0697
1,650,000
533
x512
534
Chesbro
②


500
525
550
301
Chesbro Reservoir
Jorgensen
ECKLAND
Chesbro
228,000 N
1,648,000
NANDEZ
I-3
DIAZ
SARGENT
SMITH
CALLAHAN
20780
PIETRUSIEWICZ
Lak

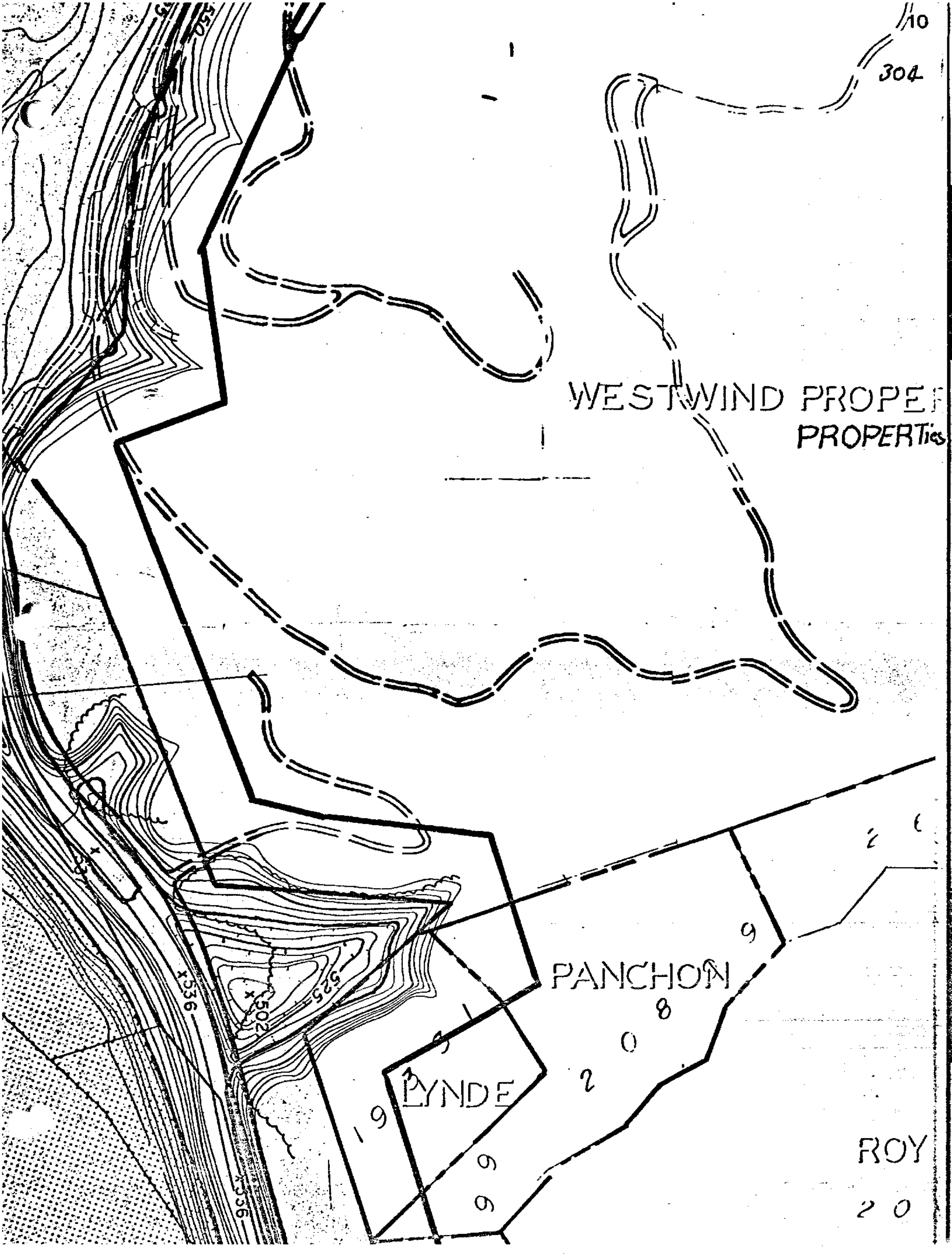

500
525
550
x54
302 8
06'
ECKLAND
HERNA
JORGENSEN
NLARGEMENT
n Elev. = 535'

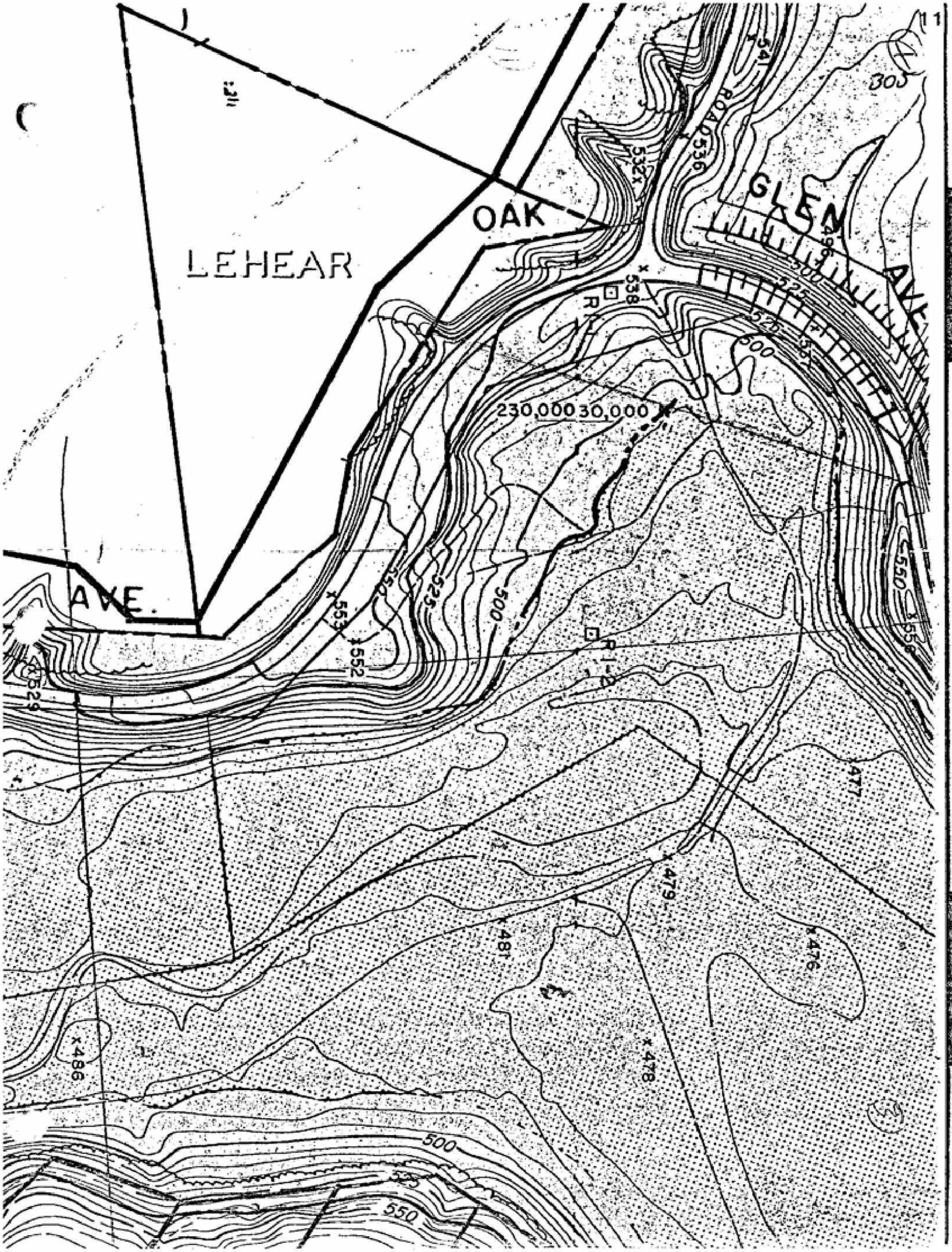


CHESBRO RESERVOIR EN

PL-566

Existing Top of Dam El
Proposed Top of Dam El


10
304
WESTWIND PROPEF
PROPERTies
PANCHON
9
8
0
2
LYNDE
1 9
9
9
ROY
2 0
x536
525
x502
x536


LEHEAR
OAK
GLEN
AVE
AVE.
ROAD
541
305
536
532
538
R1
496
500
525
525
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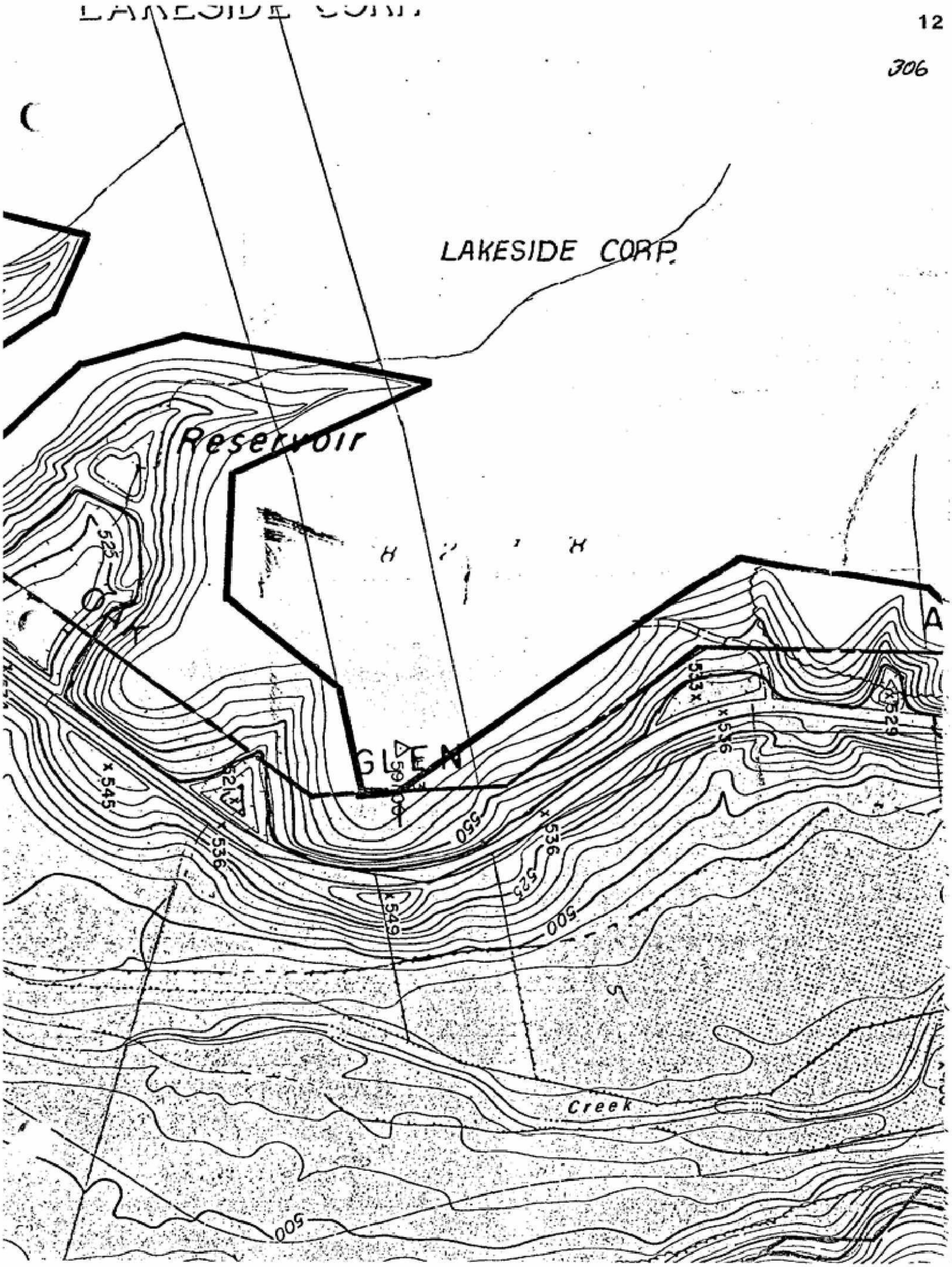
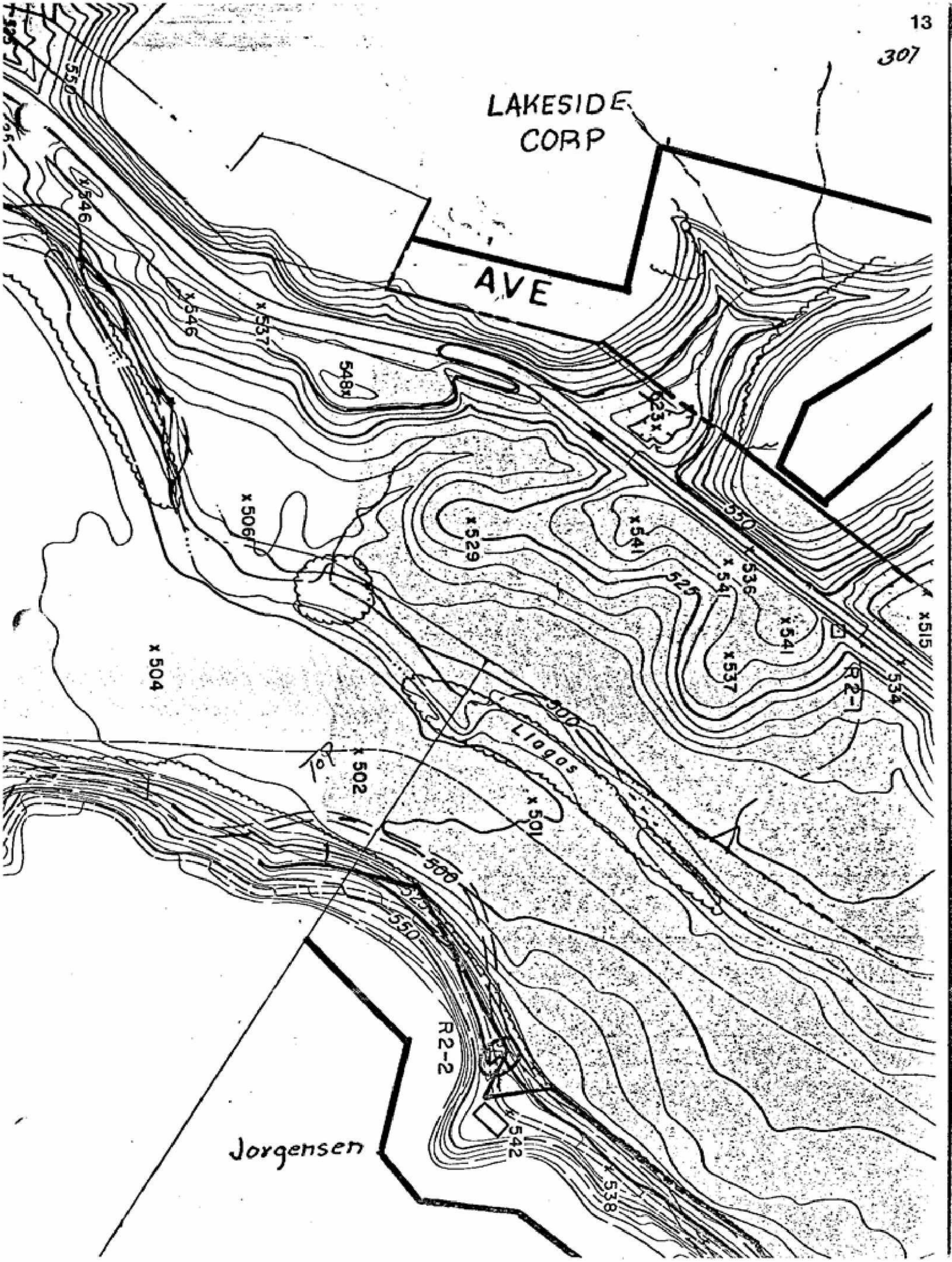
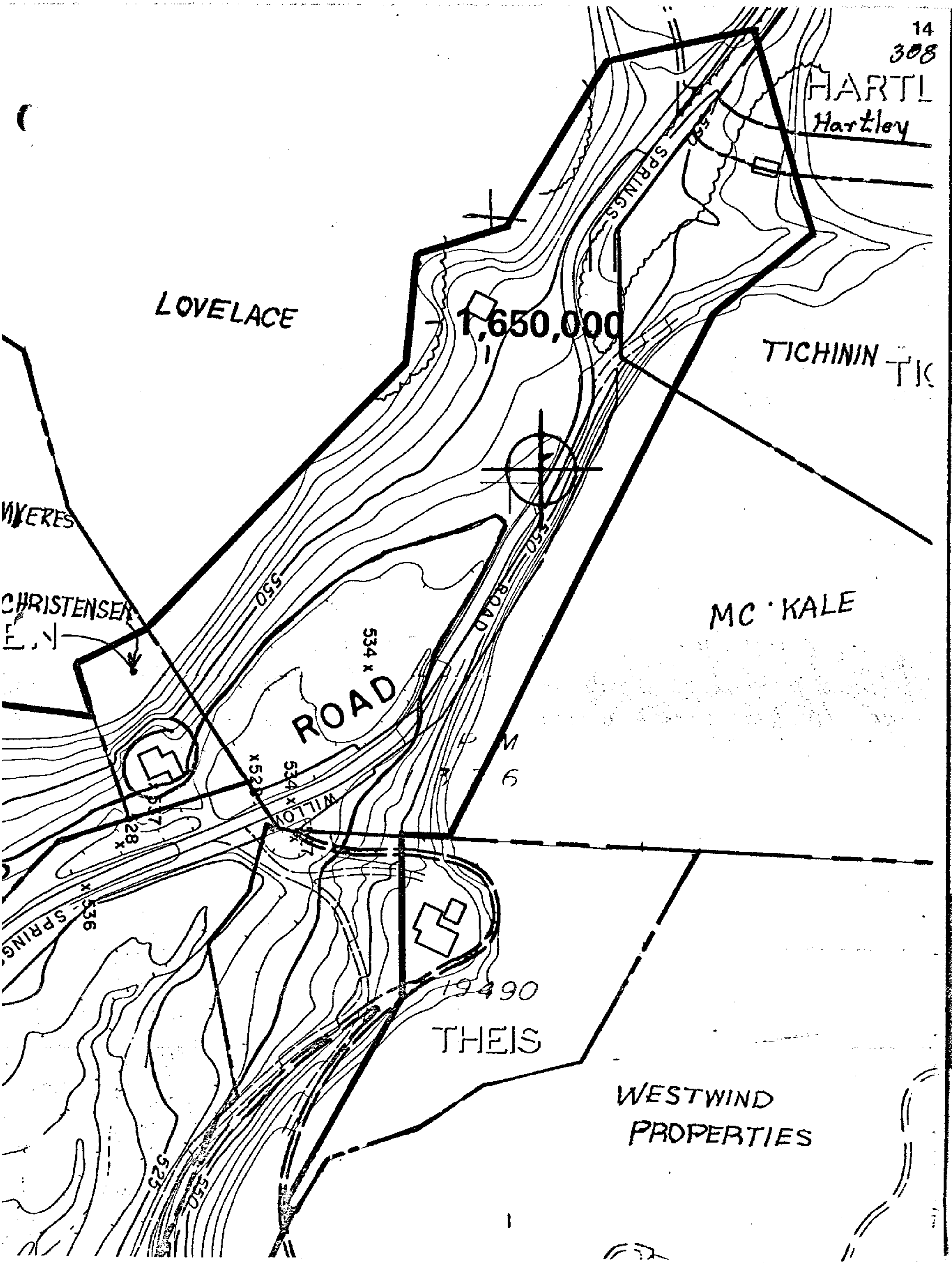
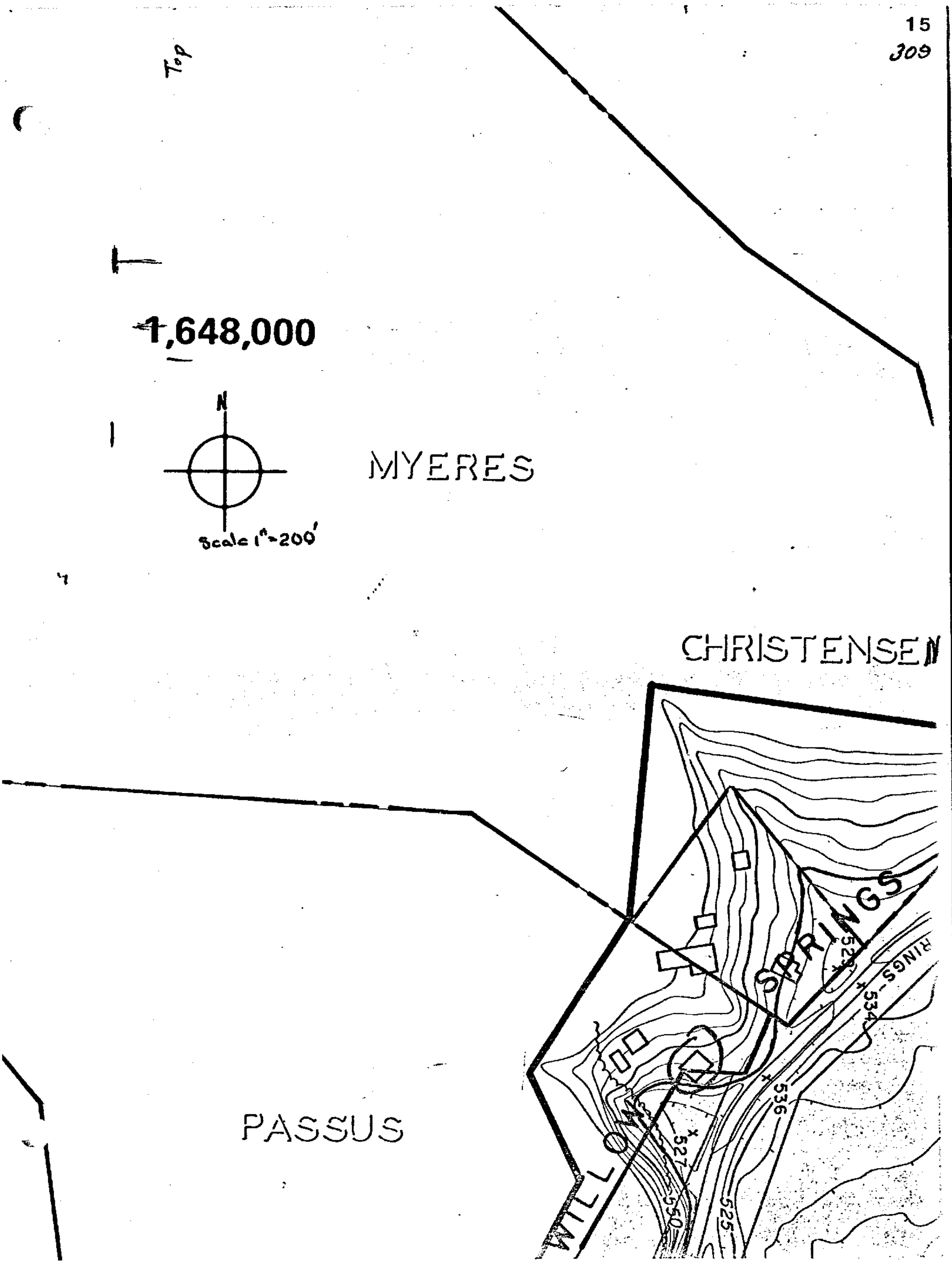
230,000
30,000
550
525
500
553
552
529
R1-2
550
556
477
479
481
476
486
478
500
525
550

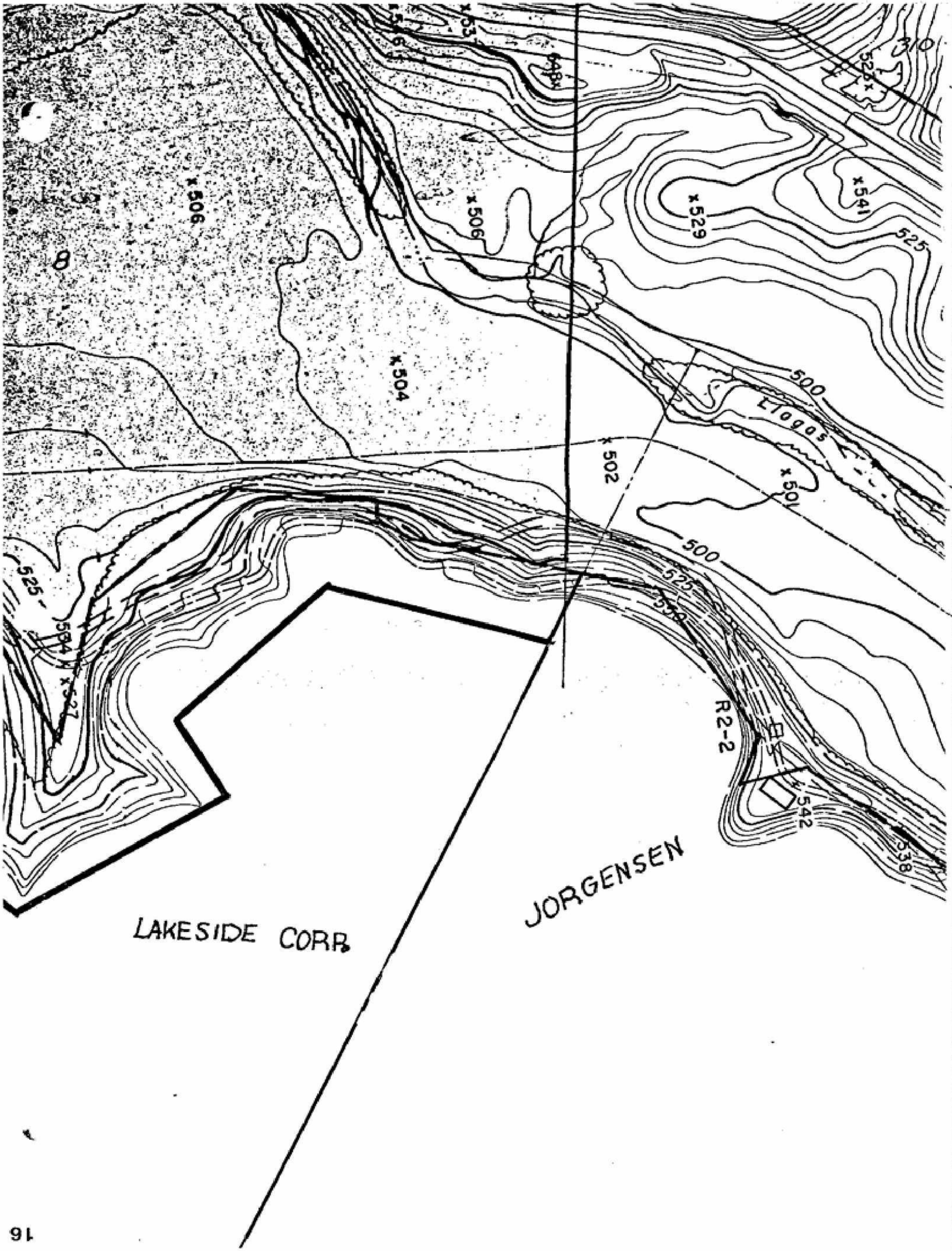
306


LAKESIDE CORP.
LAKESIDE CORP.
Reservoir
525
GLEN
x 545
521
536
x 549
550
x 536
525
500
533 x
x 536
529
Creek
500

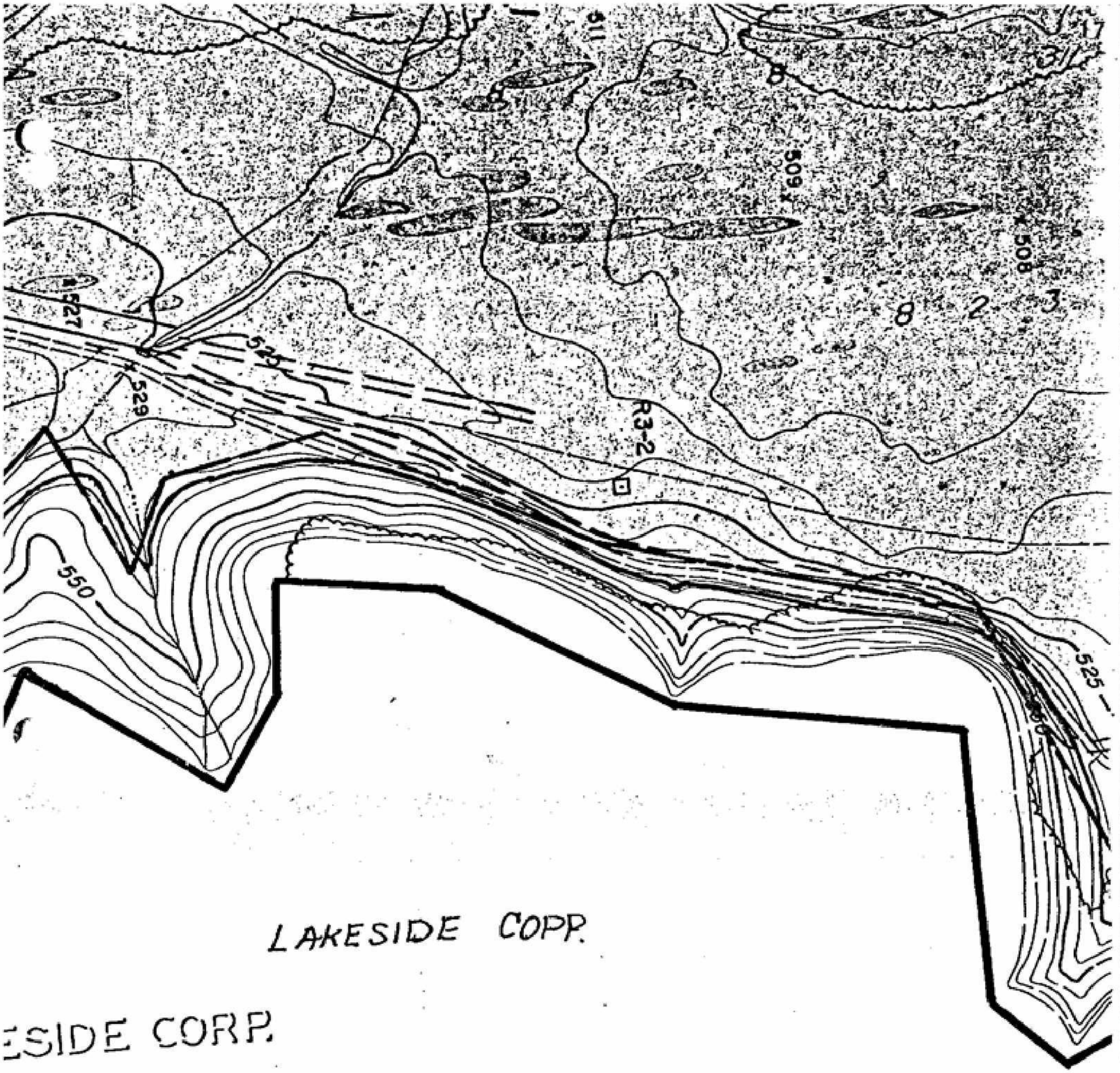

LAKESIDE CORP
AVE
550
x 546
x 546
x 537
548x
523x
x 529
x 541
525
x 541
x 536
x 541
x 537
x 515
534
R2-1
x 506
x 504
500
Llagos
x 502
x 501
500
525
550
R2-2
x 542
x 538
Jorgensen


HARTL
Hartley
LOVELACE
1,650,000
TICHININ
TI(
WKERES
CHRISTENSEN
MC·KALE
550
550
550
SPRINGS
ROAD
ROAD
534 x
x52
534 x
WILLOW
28 x
x 536
SPRINGS
19490
THEIS
WESTWIND
PROPERTIES
525
550

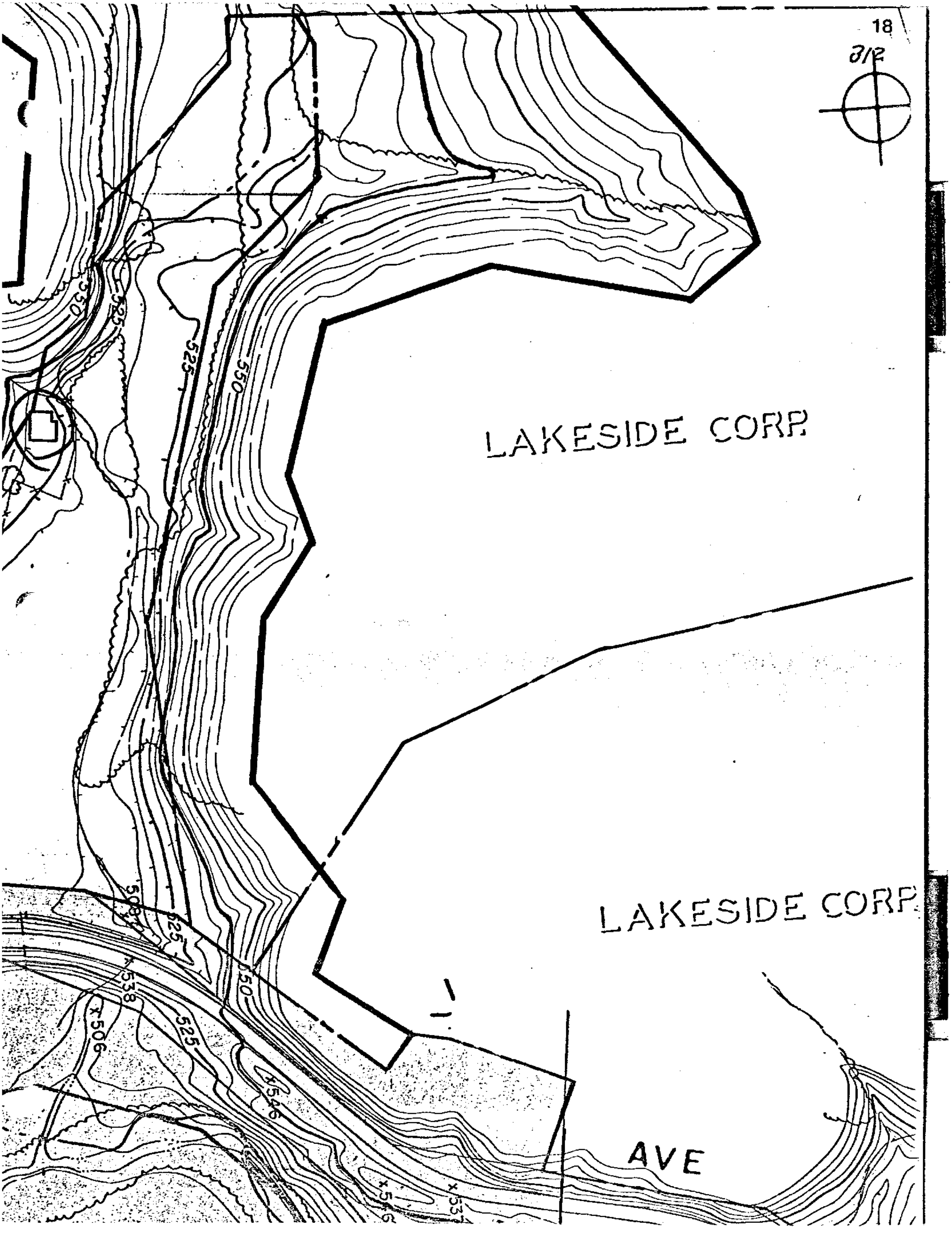

Top
1,648,000
N
Scale 1"=200'
MYERES
CHRISTENSEN
PASSUS
WILLOW SPRINGS
RINGS
523
534
536
527
550
525



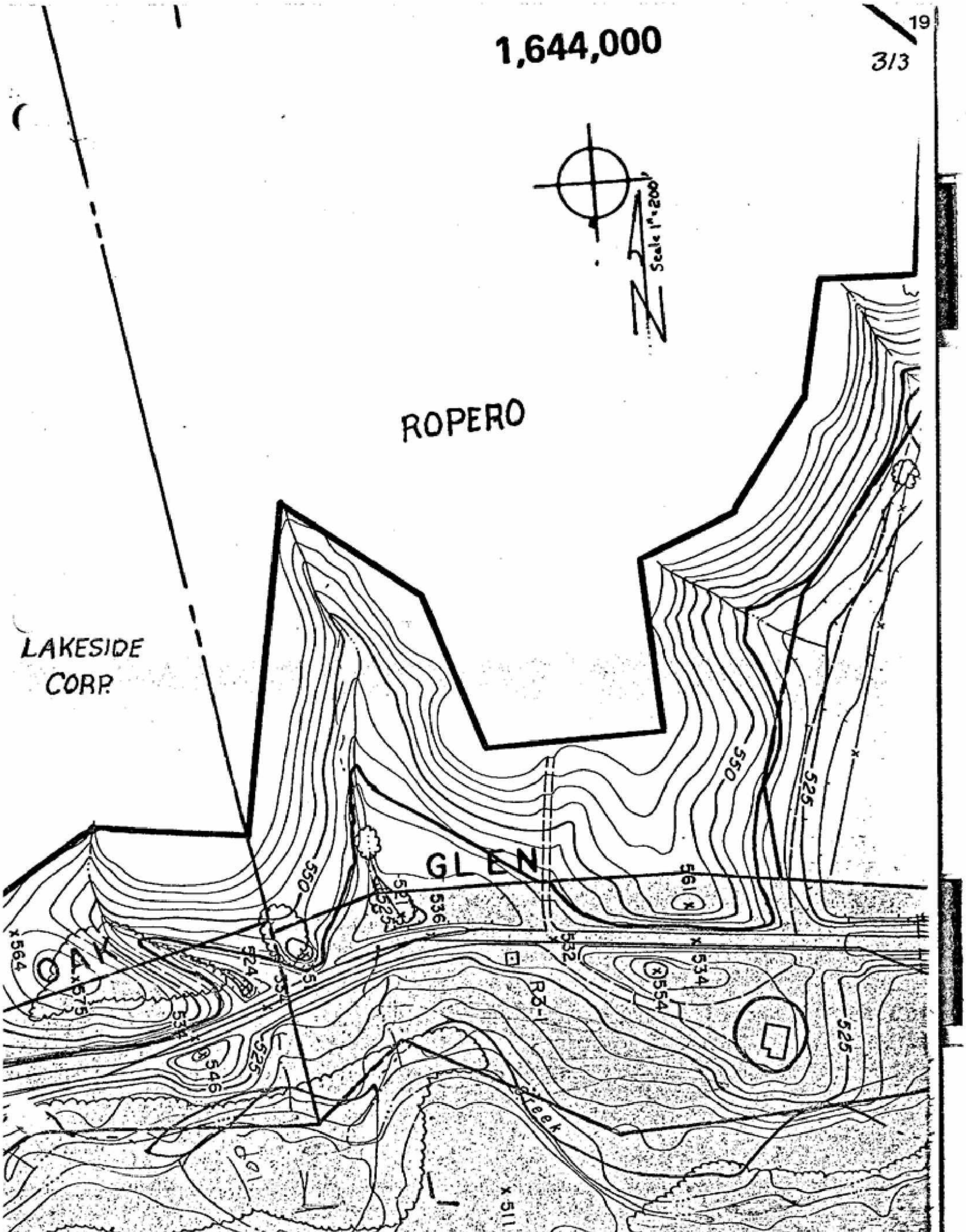
x 506
8
x 506
x 504
x 529
x 541
525
522
310
500
Llagas
x 502
x 501
500
525
550
525
584
x 527
R2-2
542
538
LAKESIDE CORR.
JORGENSEN

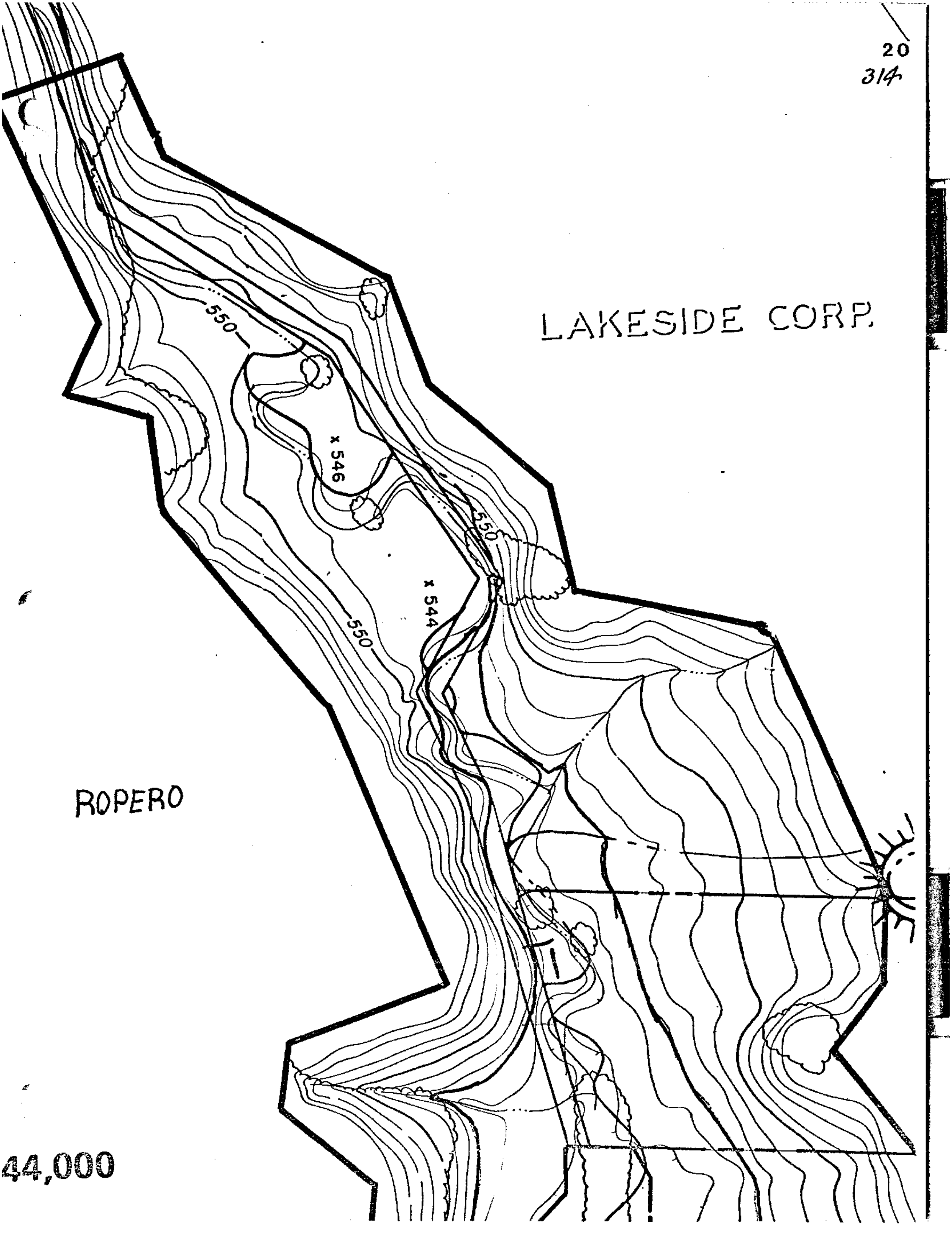

511
509
508
527
529
525
R3-2
8 2 3
550
525
LAKESIDE COPP.
ESIDE CORP.

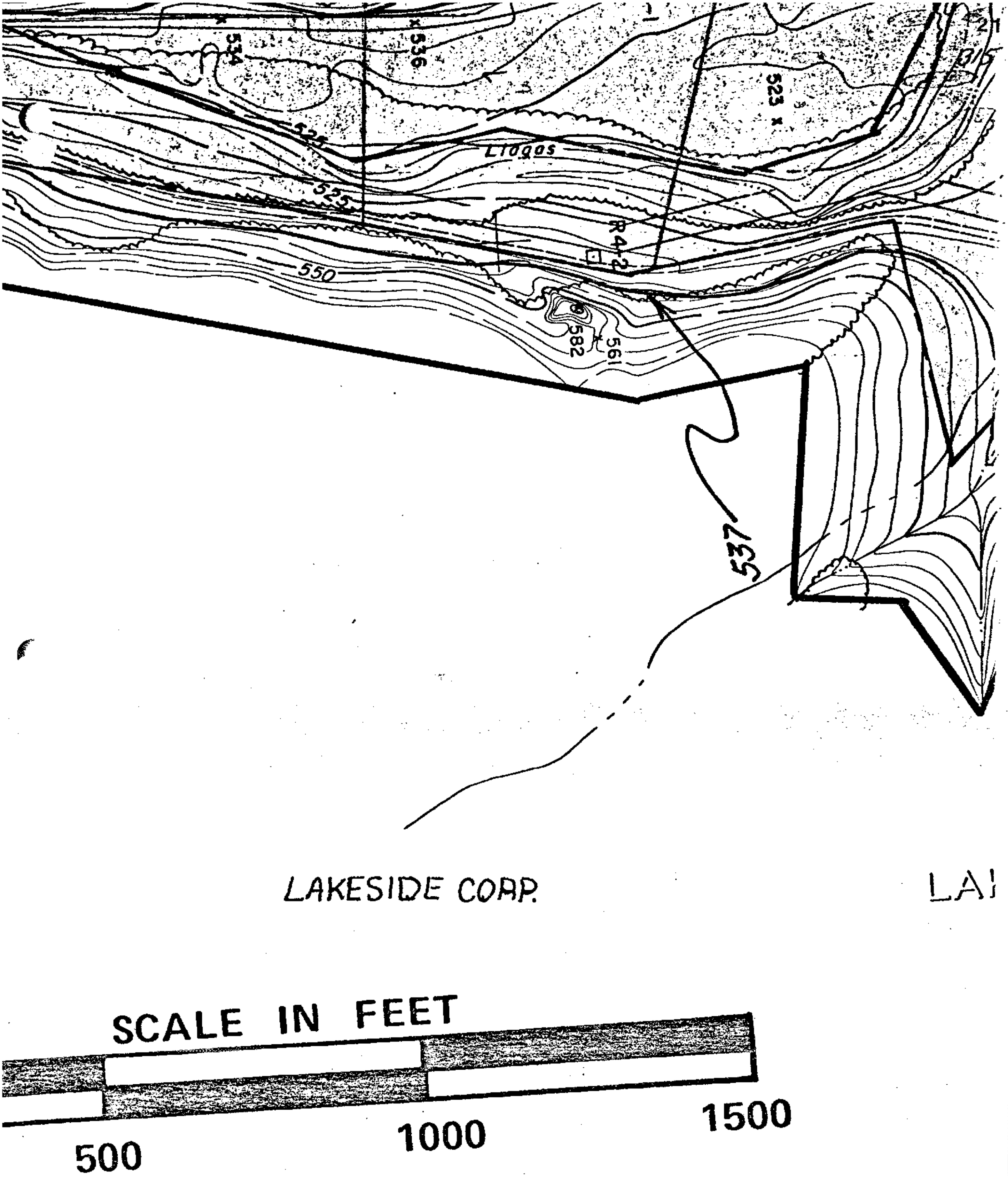
2/2

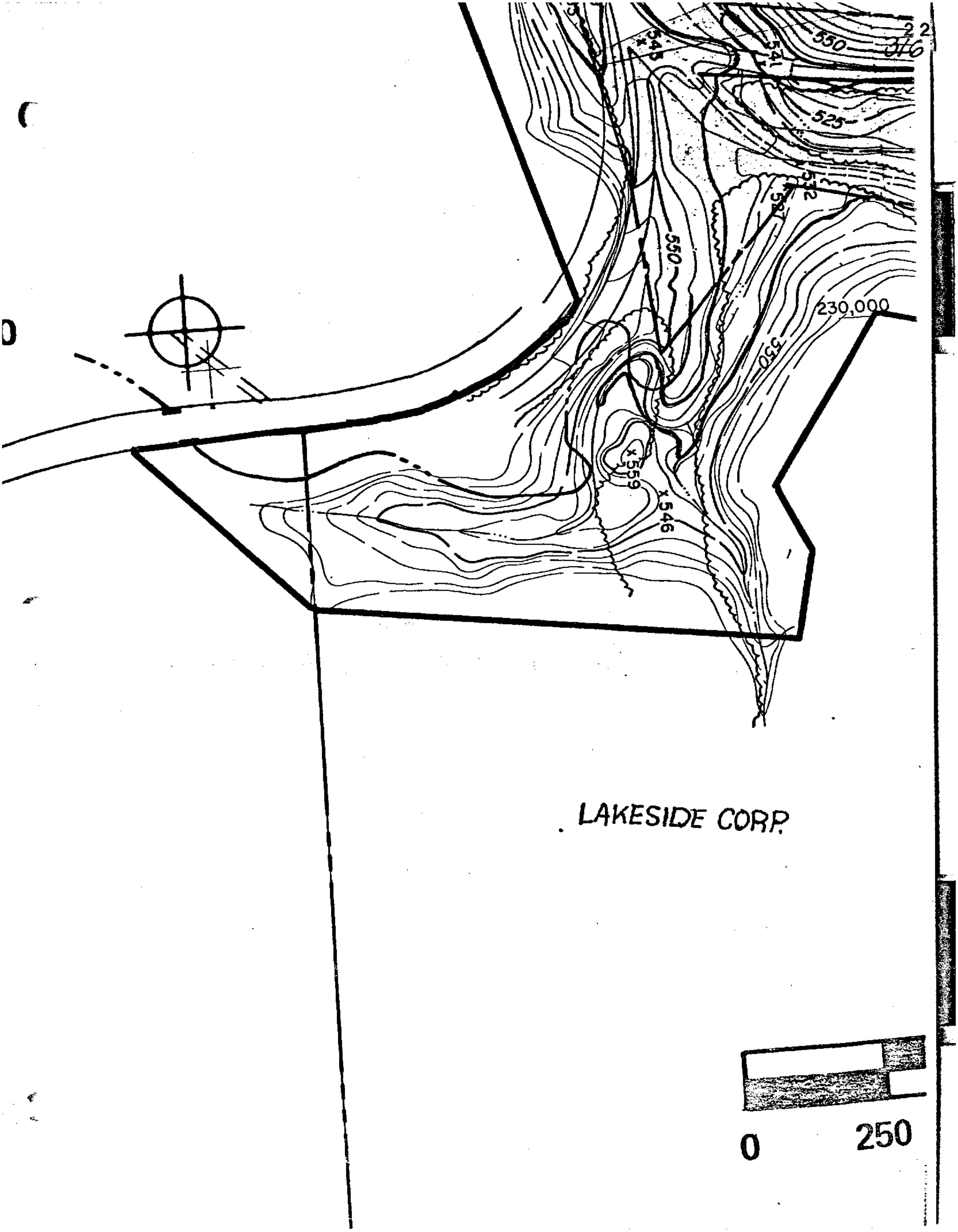

550
525
525
550
LAKESIDE CORP
LAKESIDE CORP
508
525
538
x506
525
550
x546
AVE

3/3

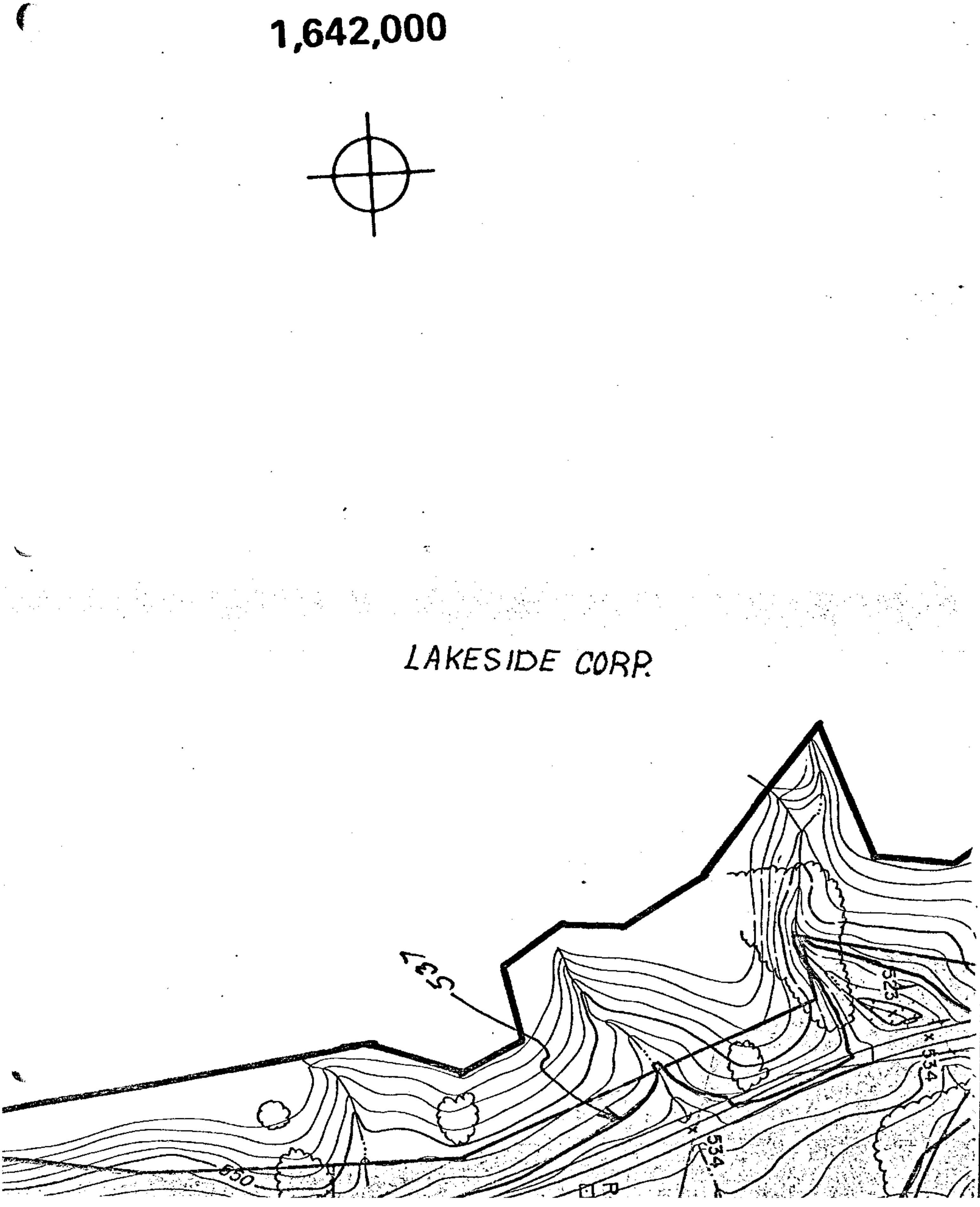

1,644,000
Scale 1"=200'
ROPERO
LAKESIDE CORP.
GLEN
OAK
550
550
525
525
561
534
554
532
536
521
525
524
534
534
546
525
564
575
R3-1
Creek
511

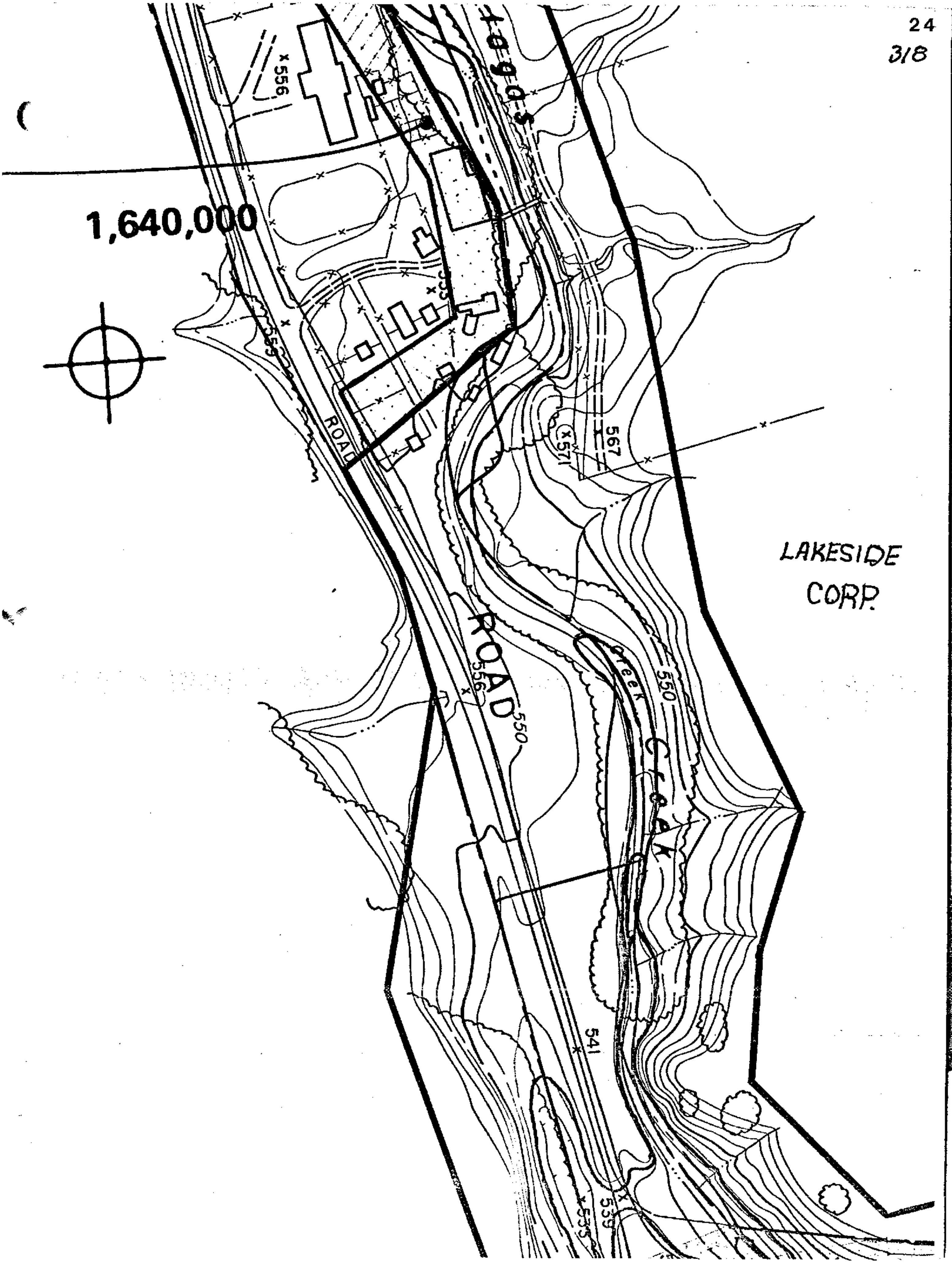

LAKESIDE CORP.
550
x 546
550
x 544
550
ROPERO
44,000


534
536
523
525
Llagas
525
R 4-2
550
582
561
537
LAKESIDE CORP.
LA
SCALE IN FEET
500
1000
1500



550
316
22
548
541
525
532
53
550
230,000
550
559
546
LAKESIDE CORP.
0
250


1,642,000
LAKESIDE CORP.
537
523
534
534
550


1,640,000
556
559
555
ROAD
567
571
ROAD
556
550
Creek
550
Creek
541
539
535
LAKESIDE
CORP.

SECTION XX

Alternative
Cost
for
LOWER LLAGAS CREEK WATERSHED PROJECT
&
UPPER LLAGAS CREEK WATERSHED PROJECT

Calif
LL Hansen 3-28-79
Alternative

Lower & Upper Llagas Creek WS.

SECTION XX

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Upper Llagas Creek Watershed	322

Calif
L L Hansen 3-28-79

Lower Llagos Creek WS

Cost data related to protection of existing excavation by Cal Trans

Llagos

182+00 - 379+00

Drop Structures	1,094,240	
Drain inlets	21,000	
Riprap	716,280	
Filter Stone	396,750	
Seeding	10,062	
Landscape	46,800	
		2,285,132
	15%	342,770
		2,627,900

West Branch Little Llagas
0+00 - 168+00

Drop Structures	195,200	
Drain inlets	51,000	
Riprap	9,980	
Filter Stone	5,325	
Seeding	20,378	
Landscaping	30,300	
		3.11683
	15%	46752
		358,435

2,986,335

Calif
LL Hansen 3-28-79

Upper Llagas Creek W.S.

Cost data related to protection of existing excavation by Cal Trans.

East Little Llagas
Sta
0+00-183

Drop Structures	303,200	
Drain Inlets	60,000	
Riprap	14,600	
Filter Stone	8,235	
Seeding	15,139	
Landscape	34,200	
		435,374
	+15%	65 306
		500 680

Llagas
458+00 - 513+00

Drop Structures	195,200	
Drain Inlets	18,000	
Riprap	344,640	
Filter Stone	154 510	
Seeding	291	
Landscape	17,100	
		729,741
	+ 15%	109 461
		839,202
		1,339,882

Σ Lower & Upper Llagas
Cost Related to protection of existing excavation by Cal Trans

Lower Llagas	$ 2,956,335	
Upper Llagas	1,339,882	
Total	4,326,217	use $4,330,000

Engineering Services 20%
865423
5,191,463 use $5,190,000

SECTION XXI

REMAINING PROJECT

INDEX XXI

Lower Llagas, Total Remaining Cost 325
Upper Llagas Total Remaining Cost 326
Llagas Creek WS 327
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  Annual Benifits
  Land Treatment
  Structural Measures
  Engineering Services & other Costs
  Total Structures
  Total Project
Llagas Creek WS 328
  Ave. Annual Cost
  Ave Net Benifits
  Employement
Llagas Creek WS Summary Table 329

Calif
Lower Llagas Creek WS
L L Hansen 5-4-79
Cost of Remaining Work

Total Project Cost		= 22,293,000
Previous Work		
0400-6400	991,000	
Land Treatment	143,000	
		-1,134,000
Total Work Remaining		$ 21,159 000

Calif
L L Hansen 5-4-79
Cost of Remaining

Upper Llagas Creek WS

Total Project Cost	21,391,000
Previous Work	617,000
Total Work Remaining	$ 20,774,000

Llagas Creek WS

Total Work Remaining

Lower	21,159,000
Upper	20,868,000
Total Cost	$42,027,000

Annual Benifits

Lower	1,717,700
Upper	1,358,000
Total	$3,075,700

Land treatment

Lower	260,000	−	143,000	=	117,000
Upper	830,000	−	617,000	=	213,000
Total	1090 000	−	760000	=	$330,000

Structural Measures

Lower	12,652,000	−	580,000	=	12,072,000
Upper	10,384,000	−	0	=	10,384,000
Total	23,036,000	−	991,000		22,456,000

Engineering, Land Rights & Admin

Lower				
Installation Services	3,200,000	−	145,000	= 3055,000
Other	6,181,000	−	266,000	= 5915,000
				8,970,000
Upper				
Installation	2,834,000			
Other	7,343,000			10,177,000
Total				19,147,000

TOTAL Structure	$41,603,000
Total Remaining Project	$41,933,000

Calif
L L Hansen 5-4-79

Llagas Creek WS

Ave An. Cost

Total Structural Measure

41,603,000 x .03388 = 1,409,509

Use $1,410,000

Ave Net Benifits

Annual Benifits - Annual Cost

3,075,700 - 1,410,000 = $1,665,700

Employement

Lower	159,300
Upper	127,100
	$ 286,400

Calif — Llagas Creek

L L Hansen 5-4-79

Cost of Remaining Work Summary

Item	PL 566	Other	Total
Land Treatment			
Lower	7,000	110,000	117,000
Upper	29,000	184,000	213,000
	36,000	294,000	330,000
Structural Measures	22,456,000	—	22,456,000
Engineering, Land Rights and Administration			
Lower	3,055,000	5,915,000	8,970,000
Upper	2,834,000	7,343,000	10,177,000
	5,889,000	13,258,000	19,147,000
Total Structural Measures	28,345,000	13,258,000	41,603,000
Total Project	28,381,000	13,552,000	42,933,000